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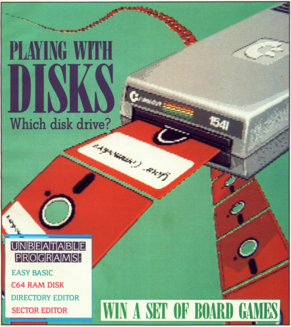

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Reviewed: Bards Tale II · Strike Fleet · Sherlock · Super Cat · Rim Runner

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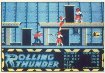
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ARGUS
PRESS
GROUP

JULY ISSUE AVAILABLE 3rd JUNE 1988

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DATA STATEMENTS

Bill Oddie Micronet

To many people, computers and conversation lie at opposite ends of the ecological spectrum, but the two were brought together recently when Bill Oddie appeared on Micronet's Celebrity ChatLine.

'Prince Charles hit the nail on the head when he said conservationists need a more up-to-date image and events like this interview with Micronet are an excellent example of how we are using today's technology to help preserve the environment,' said Oddie, Vice-President of the British Trust for Conservation Volunteers.

The main purpose of Oddie's appearance was to promote the Trust's campaign to plant a million trees. The devastation of the South East's trees in last October's gales formed the grim inspiration for the Trust's initiative and Oddie took advantage of the opportunity to spread the word.

Micronet is also taking an interest in the campaign by running a competition offering 'tree-inspired' prizes with all proceeds going to the BTCV Emergency Tree Fund.

Anyone wishing to help out can contact the BTCV at the address below, for details of their Emergency Tree Pack which gives advice on how to plant and care for trees in your area.

Touchline:

The British Trust for Conservation Volunteers. Tel: *0491 39766.*

A rare sighting of the mating display of the Goodie goodius in the shade of a fruiting Peasea tree.

Clive Grace (A&B Computing), Grot Bags and Stuart Cooke (Your Commodore) at the Frightmare launch. Which one's Witch?

Which Witch?

It takes a lot to shatter the calm composure of Fleet Street but Grot Bag's appearance at the unveiling of Cascade's Frightmare stopped traffic, frightened the horses and sent kids screaming home to Mum. Never had the Street of Sham borne witness to such a gruesome sight emerging from a London taxi. Yes, folks, the editor was attending another press l (a)unch!

This vain attempt to achieve a lager in his own lunchtime overshadowed the attendance of the Witch of Pink Windmill (BBC TV) fame among the fake cobwebs of Ye Olde Cheshire Cheese, one of Fleet Street's oldest and best known watering holes.

Frightmare is a game which takes you into the dark recesses of your own subconscious and releases the phobias and phantoms that lurk there. The Commodore 64 cassette costs £9.95 and a disk version is available from £19.95.

Back at the launch, the proceedings were given an extra touch of class when the Editor created havoc by stuffing his arm firmly up the parson's nose of a roast chicken while saying, "How's this for a Rod Hull impersonation?"

Grot Bags was highly emu-sed by this bot gag and the game was declared well and truly open.

Touchline:

Cascade Games: *1-3 Haywra Crescent, Harrogate, North Yorkshire HG1 5BG.* ***Tel:*** *0423 523325.*

Falling Fortunes

No, Gremlin are not on the breadline, but the programmers are being dropped from a great height and it's all for charity.

Seven of Gremlin's programmers are risking life and limb to raise funds for the Royal National Lifeboat Association by leaping from a plane over the Nottinghamshire countryside. Fortunately, they should all be wearing parachutes at the time.

Gremlin has supplied a list of names of the participants: Colin 'Fungus' Dooley, Mark Rogers, Paul Jackson, Rob Toone, Andy Greene, Stuart Gregg and Jon Harrison. Managing Director of Gremlin, Ian Stewart would love to take part I'm sure but he has an urgent chiropody appointment on that day; a bit of trouble with cold feet I believe.

The Gremlin team would be delighted to receive sponsorship or donations which should be sent to Sue Quinn in Birmingham.

Touchline:

Gremlin Graphics: *Unit 2/3 Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021-356 3377.*

Gutz News

A trip to hospital has inspired a game by the Special FX team of Robert Tinman and Andy Rixon. Gutz is based inside the body of an alien and Rixon got the idea when he underwent an exploratory barium meal which resulted in some stimulating pictures of his inner workings.

The game is a cross between the Fantastic Voyage and the Biblical tale of Jonah and the Whale. After being gobbled up by an alien, the player has to find a way out through the mouth again. On the way the player is assailed by lethal gasses and microbes and the aim is to bump off the aliens organs one by one before an escape can be affected.

The game is to be released by Ocean Software for £8.95 on cassette and £12.95 on disk.

Touchline:

Ocean Software: *6 Central Street, Manchester M2 5NS.* ***Tel:*** *061-832 6633.*

Your Amiga

Argus Specialist Publications are pleased to announce the launch of their new magazine — Your Amiga.

For several months the magazine has been incorporated as a separate part of Your Commodore but now the time has come to sever the umbilical cord and let it enjoy a life its own.

For Amiga owners the pages are filled with news, views, facts and programs galore. A full 72 pages which will help to unveil the hidden depths of Commodore's premier computer.

Your Amiga will be available every second month so don't miss the first issue on May 20th — price £1.50.

Close but...

Red faces and apologies time to Bytes and Pieces. The review of Helper 128 in the May Issue of Your Commodore credited the package to Financial Systems Software. True, they do supply it but Bytes and Pieces were the actual company who supplied the review sample.

Bytes and Pieces can be contacted at 37 Cecil Street, Lytham, Lancashire FY8 5NN.

Sorry about that B&P!

Widening the Net

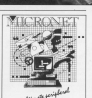
Telemap, the company behind Micronet, is projecting a more positive image for this year with the broadening of the company into new areas.

‘Micronet is the most successful service of its kind in Europe but that's no reason to be complacent”, explains John Tomany, managing director of the newly renamed Telemap Group. The restructuring has resulted in the creation of five distinct areas: Micronet, Interbusiness, Value Added Services, Open Access Data Services and International.

Micronet is also receiving a general overhaul which includes the revamping of its daily news service for the home and small business market as well as computer specific magazines. The magazines are published weekly and each magazinc has a diffferent update day. For Commodore 64/128 users the press day is Wednesday and on Thursday for Amiga and Atari users.

The contents of each magazine are easily accessed from a single index page and back issues and selected articles will remain on-line for four weeks at a time.

Also included in the new system is a conferencing facility containing 30 ‘rooms’. TeleTalk allows a user to hold live conferences or discussions with up to sixty-three other users and breakaway or private meetings can always be convened in any of the other vacant rooms.



A new look for Micronet

Telemap Group's Micronet is the latest information provider on the Prestel network with a user base of 25,000 people accessing 35,000 pages and a free demonstration can still be accessed by dialling into 01-623 8855, entering the ID number 4444 4444 44 and a password of 4444.

Touchline:

Telemap Group Ltd: *Durrant House, 8 Herbal Hill, London EC1R 5EJ.* ***Tel:*** *01-278 4136.*

DATA STATEMENTS

A Fair Cop

The Association of Chief Police Officers has decided to adopt the guidelines laid down by the Data Protection Registrar's Codes of Practice.

The coming of the Data Protection Act has posed new problems for the police force because of the delicate nature of the information they accumulate. Geoffrey Howe states, 'There are a number of particularly welcome aspects of the Codes, for example... The detailed guidelines for security, and for monitoring and inspection are also welcome.'

Obviously there are some records which would impair police operations but the Codes recommend that, when collecting personal information, the police should inform the individual concerned as to the purposes for which such information will be, whenever possible. Copies of the police Codes of Practice are available from: Chief Superintendent, Communications Department, Merseyside Police, PO Box 59, Liverpool L69 1JD for £4.00 (cheques payable to Merseyside Police).

Touchline:
Assistant Data Protection Registrar: *Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX.* ***Tel:*** *0932 225526.*

YER Bug Fix

Despite the undoubted quality of Precision Software's Script/Plus cartridge for the Plus4, some users have found that it refuses to send more than the first character of a document to an RS-232 printer. York Electronic Research have responded to pleas for help by producing a replacement ROM which fits inside the Plus 4.

In operation, the ROM only affects the Script/Plus RS-232 output and is totally invisible to all other software.

The ROM costs £9.99 and an RS-232 interface is also available for £34.99, backed by YER's 'guaranteed to get you working' after sales services.

Touchline:
York Electronic Research: *The Fishergate Centre, 4 Fishergate, York YO1 4AB.* ***Tel:*** *0904 610722.*

Some of the winners of US Gold's California Games competition look forward to the launch of Epyxz' The Games-Winter Edition.

Datasoft Deal

Stephen Hall of Grandslam Entertainments is a man turning a dream into reality. Since his acquisition of the company at the end of last year, his determination to turn the company's failing fortunes into a success story seems to be bearing fruit. The five-cornered fight for the US rights to Grandslam's The Hunt for Red October has led to a three year trial marriage between the eventual winners, Datasoft and Grandslam.

The reciprocal deal means that autumn will see Datasoft's follow up to Alternate Reality appearing over here under the auspices of Grandslam. The deal is a result of Datasoft's disatisfaction at its arrangement with US Gold and its desire for a 'positive marketing operation' for its products over here.

Hall is determined to make Grandslam a major force in the British industry with its launch of the superb Pacland conversion backing up Red October with more titles lined up for later release.

Touchline:
Grandslam Entertainments: *Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01-439 0666.*

Joystick Wizards

The Personal Computer Show at Earls Court will be the venue for the first National Computer Games Championship. Sponsored by US Gold, the organisers will be Newsfield Publications and the National Association of Boy's Clubs.

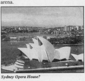
As publishers, Newsfield has always shown a passionate interest in the activities of Britain's youth and the first round will be conducted in heats at six regional Boy's Clubs centres around the UK, on both Spectrum and Commodore 64 formats.

London and Leeds will host the semi-finals in August, leading up to the finals during the three public days (16-18 September) at the Show itself.

Touchline:
MPA Limited: *8-10 Hallam Street, London W1N 5LF.* ***Tel:*** *01-636 3205.*

Power House Sydney

The Power House has concluded a deal with the Sydney Development Corporation of Canada. Before the agreement was made the rights to all Sydney's games were handled by US Gold so the new deal will bring games such as BC's Quest for Tyres, Grogg's Revenge, Fight Night, Dambusters and Desert Fox into the budget price arena.



Sydney Opera House?

Some of these titles have appeared on Mastertronic's American label but from now on the power lies in the hands of the Power House.

This move underlines Ashley Hildebrandt's determination to release games of the highest possible quality and get away from their old image before this year's take-over.

Touchline:
The Power House: *Powerhouse Publishing Ltd, 204 Worple Road, London SW20 8PN.* ***Tel:*** *01-879 7266.*

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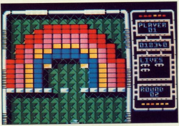
Games Update

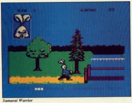

PLAYER 01
018360
LIVES
ROUND 02

Arkanoid II

Alot of new releases this month but unfortunately, only a few of the titles rise above mediocrity and even among these, there is precious little originality

Top title for addictiviness is undoubtedly ARKANOID – REVENGE OF DOH from Imagine. Even if this Breakout clone does only offer a few new features, there is something about it that demands just one more go. Presentation could be better though. There is no excuse for not including a redefine keyboard option and a pause would have been more than useful.

Bargain of the month is again, easily decided. Gremlin's COLOSSAL COMPILATION offers ten games for just under a tenner. The titles are Auf Wiedersehen Monty, Thing Bounces Back, Rebounder, Jack the Nipper II, Mask,



Samurai Warrior

ROLLING THUNDER
SCORE 000000
BULLET 043
MG BLT 000
TIME 240
MEN 5
LIFE

Rolling Thunder

Basil the Great Mouse Detective, Convoy, Death Wish III, Bulldog and the Samurai trilogy.

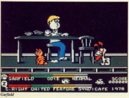
Beat'em-ups continue to provide a source of rich pickings for authors although there is nothing here that you haven't seen many times before. SAMURAI WARRIOR from Firebird is set in mediaeval Japan where not only you go around hacking people to bits with your sword but you must also bow to them first. ROLLING THUNDER from US GOLD may be a conversion of one of the best known arcade games currently around, but it is so mindblowingly numb it becomes instantly forgetable. PREDATOR from Activision is a tie-in based on the film starring Arnold Schwarzenegger in which he tries to rescue some diplomats in the face of a strange alien threat.

It is interesting that most of the people who will buy this game will not be allowed to see the film. There must be a message there somewhere.

On the more traditional shoot'em-up front come two titles from the US Gold GO label. SIDE ARMS is a one or two player game, blast the baddies and pick up capsules which give your ship extra powers. Where have we seen that before? A free rock tape may or may not persuade you to investigate. BEDLAM is a vertically scrolling game and does actually have an original feature (shock horror!). However, the chances are that you will not be able to guess what it is. Give in? You get transported into a giant galactic pin-ball game! Don't be too upset if you didn't get it right. I've played the game and still can't believe it's true.

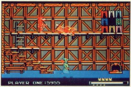
00004700
01
000000000
Bedlam

Arcade adventures seem to be making something of a comeback. That superstar of the cartoon strip GARFIELD stars in his very own game, Big Fat Hairy Deal produced by The Edge. Arlene has been whisked off to the city pound and our eponymous hero must stop stuffing his face long enough to effect a rescue.



Garfield

BLACK LAMP from Firebird is a good old rescue the princess by collecting assorted lamps while simultaneously leaping around the various platforms, avoiding being shot by the multitude of nasties type game. It looks very good but doesn't play quite so well. VAMPIRE'S EMPIRE from Magic Bytes is a similar affair although I may have missed some of the subtleties as instructions were only provided in French and German. You have to manipulate a beam of light through the castle by strategically placing mirrors in the 160 rooms. Again, looks good, plays poorly.



Black Lamp

FRIGHTMARE from Cascade is the third of three games all looking vaguely similar. You have two aims. One is to wake up while experiencing the worst dream you can manage. DEMON STALKERS from Electronic Arts is a Gauntlet clone that reached number one in the States. It plays very well although some of the rooms may be a little tricky in one player mode. I can't help but feel that it's been launched about six months too late.

MAGNETRON is Steve Turner's first game since joining Firebird from Hewsons and it is very difficult to see the difference as the resemblance to his old game Paradroid is uncanny. Grapple with droids to improve your weaponry, etc, etc. Your eventual aim is to disassemble or shut down eight reactors. TROLL from Denton Designs certainly looks

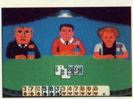
Magnetron

original although closer examination shows it to be little more than a Q-Bert derivative. You bounce round rocks avoiding goblins while trying to collect bits of a crystal. There are holes to be jumped through (although some are death holes) leading to other chambers. What makes the game unusual is another set of boulders on the ceiling which you can spring up to and down from. Your ultimate success though is likely to depend on how well you can control a spinning wheel of fortune, achieved by leaping up and down on short-lived mushrooms.

Very little on the adventure front this month. Apart from the Infocom game (see elsewhere in this issue), the only offering to hit my desk is WOLFMAN from CRL. Wolfman is from the pen of Rod Pike who gave us Dracula and Frankenstein. The story involves your attempts to discover more about the reasons your face turns hairy every time there is a full moon. If you are lucky, you may even find true love at the end of the road. This game is nowhere near as well-written as its predecessors and is further spoilt by a series of annoying bugs.

A more sophisticated simulation is STEALTH MISSION from Sub Logic whose games are now going to be marketed in this country for the first time rather than having to import them. Their original flight simulator is still the Daddy of them all and it was rumoured that it was so accurate that if you could master it, you could land a light plane in an emergency. Here you get the chance to fly three different aircraft on a variety of missions – F-19 Stealth Fighter, F-14 Tomcat and the X-29. As this latter aircraft is still only experimental, I can't vouch for the exact accuracy of the simulation but I don't expect too many people will be in a position to contradict.

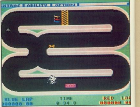
A somewhat less hazardous mission is a quick session of cards, brought to you by Electronic Arts/Accolade in CARD SHARKS. You have the option to play Hearts (better known as Black Maria in this country) pontoon or three kinds of poker. You can choose from six different opponents including Maggie, Ronnie or Gorby. The game lacks the excitement of the real thing and is too easy to beat. The highlights are some of Ronnies comments such as I told Nancy that I was at one of Ollie North's shredding parties!



Card Sharks

For those who enjoy putting some thought into their gaming, SORCEROR LORD from PSS might be just what they are looking for. A traditional wargame but in a fantasy setting where you can summon demons to your cause should you happen to be near a rune ring. The game is pretty crude graphically compared to some of the icon driven games currently available but it will prove to be a tough opponent and experienced wargamers looking for something a bit different should enjoy the challenge.

Electric Dream's CHAMPIONSHIP SPRINT is the officially licensed version of the arcade game. A top down view of a racing track rather than the normal cockpit view is presented as you race around one of the eight tracks. Alternatively, you can design one of your own. The game comes with a complete range of parameters that you can tailor to your own requirements, all controlled by a series of pull-down menus.



Championship Sprint

POWER AT SEA from Electronic Arts is another naval simulation (see Strike Fleet elsewhere in this issue) recreating the battle of Leyte Gulf in the Second World War in which the Japanese forces launched one last major Kamikaze attack in an attempt to annihilate the American Navy. The emphasis with this simulation is very much towards arcade sequences so if you prefer manning anti-aircraft guns and launching torpedoes to plotting courses and watching sonar screens, this could be the one for you.

Last but by no means least this month is Street Sports BASKETBALL from the US Gold/Epyx stable. Choose your team from the local kids and battle it out on one of four different courts. The attraction of these street sports is that they include features not normally present in a professional game. When was the last time you saw one of the Harlem Globetrotters slip on an oil slick? This series aims to put the fun back into sport and succeeds admirably.

You may think that I have taken a somewhat jaundiced view of this month's offerings but I feel that the British Software Industry is going through something of a bad patch at the moment. There is very little original thought about at the moment and when something different does appear, it is quickly cloned by everybody else. Even though it saddens me to say it, the Americans are turning out bigger, better games, beautifully packaged and offering much better value for money.

Perhaps it is time that we stopped writing cassette based games and placed a heavier emphasis on disks. We've got an awful lot of catching up to do.

Directory Editor

Give more meaning to your Commodore disk directories

By Tony Crowther

When you use a large number of disks it can become very difficult to remember just what each program in a disk directory does. Furthermore, if you SAVE and scratch a lot of programs on your disks, finding the position of the program that you want in the directory can be very time consuming. The program presented here changes all of that by allowing you to edit your disk directories.

Basically *Directory Editor* allows you to alter the position of any file in a directory listing, alter the programs name and enter comments in the directory. Yes, there have been programs that allow you to do this which have been published in the past, but this one has a feature that makes it stand out from all the rest.

All other directory editors that I have seen allow you to enter comments into the directory listing, as does this one. But, they only allow you to edit one line at a time. With *Directory Designer* you can 'open up' a number of lines to be edited and then use the cursor keys to move around anywhere within the opened area. This makes it very easy to position text, or even to make up pictures using the graphics on the C64 keyboard.

Using the Program

Once you have a working version of the program, using it should present no problems. Simply LOAD and RUN the finished program and the program will start to run automatically. Most of the commands available to you are presented on the screen, together with necessary messages. The table gives details of all options available to you.

Getting it all in

The program is presented as a Basic loader. This should be typed in using our *Syntax Checker* see the *Listings* article for more information on this. Before you RUN the program you should SAVE the program to disk. Now enter the following commands:

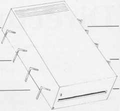
```
POKE 43,0:POKE44,18:POKE
4607,0:NEW
```

Now LOAD and RUN the Basic loader. Once finished this will SAVE the program *Directory Designer* on disk; this is the program that you should use to RUN the program, NOT the Basic loader.

See listing on page 81

KEY	FUNCTION	ACTION
F1	EDIT	Allows you to edit entries in the directory listing. You can only edit directory entries that are in white on the screen. Upon entry to this function you can't edit program files.
F7	TYPE	Pressing this key when in *EDIT MODE* will turn all directory entries white. You may now edit program file entries.
SPACE	GRAB	Removes the directory entry under the cursor and stores it. You can see the directory entry currently grabbed at the top of the screen.
	PUT	Press SPACE a second time to place the currently grabbed directory entry at the current cursor position.
↑	COPY	Place a copy of the currently grabbed directory entry at the current cursor position.
INST	INSERT	Insert a blank directory entry at the current cursor position.
DEL	DELETE	Delete directory entry at current cursor position. If you try to delete a program entry you will be asked if you are sure.
CRSR	MOVE	Cursor up/down are used to move the highlighter bar through the directory listing. When in *EDIT MODE* use all cursor keys to move the cursor around in the directory.
L	LOAD	Load the directory of the disk in the drive into memory.
S	SAVE	Save the directory that is in memory onto the disk in the drive. Make sure that you really do want to save the new directory before using this command.

30K RAM Disk



What's the best way to speed up your disk drive? Don't use it!

By Fahiem Wagiet

Why waste time loading and saving Basic programs on disk when they can be easily stored temporarily in the 64s memory. This RAM Disk program takes care of this with the minimum of fuss and bother.

A simple definition of a virtual machine would go something like this: "a piece of software designed to enhance or replace an actual hardware device performing the same function". This is a precise RAM disk description. It is a program designed to emulate and replace a physical disk drive by making ordinary computer RAM act in the same way as a disk drive would. A program like this, thus provides the user with a cheap alternative to investing in a costly, if not slower disk drive performing a similar job. The advantage to having a virtual drive is obvious. For one thing, tape users can have the same quality of storage as disk users, but at a fraction of the cost. Another advantage is speed. Typically a drive such as a 1541 takes a few seconds to access a file and another few seconds to load it.

Now, imagine a program which performs that same function, but at a much higher speed, typically not more than a few seconds for the entire access and loading operation, no matter how large the program! Program development can be dramatically speeded up by eliminating the time taken by a drive having to search for a file. Also the chance of errors creeping in are reduced.

The program I have written provides all the above mentioned advantages together with ease of use. It works by adding a number of slightly altered, but well known commands of Basic and yet, is as good as any similar commercial product. I have written a fully intelligent DOS providing loading and saving individual files from disk (RAM disk that is), cataloging the directory and formatting the disk. It has the ability to store up to ten files in memory at once, though, of course, none of these can be very large. Currently the DOS is limited to using 30Kbytes, which should be quite enough for most purposes. The DOS steals 8Kbytes from Basic memory, although this is by no means a great loss. After all, who has written a 38K program? This "stolen" RAM is used by the DOS for housekeeping, storing and accessing the directory, and general maintainence commands as well as the first few Kbytes of the RAM disk memory.

All in all, the RAM disk adds six new commands to Basic, written in the form of a wedge routine, each command preceded by an asterisk (*). The commands are:

- ***LOAD"filename"** — this loads a file from Ram disk (if it exists) into Basic program space. If it is used from program mode (from within another program), the newly loaded program begins automatic execution.

- ***SAVE"filename"** — saves a file from Basic memory to RAM disk, at all times checking whether the file already exists, whether the directory has reached its file limit of ten, or whether the Ram disk is filled to capacity.

- ***CLR** — clears the RAM disk thus making all memory available by other programs to be stored in RAM disk (similar to a formatting procedure).

- ***CAT** — displays a list of all current files in RAM disk, as well as the total capacity remaining for other programs.

- ***ERASE"filename"** —will erase a file from RAM disk freeing the memory used by this program, for use by other programs.

- ***RUN"filename"** — same as the load command, except that when used from direct mode, program automatically begins on loading.

Only Basic programs are handled by the DOS at the moment, although if you really wanted to use machine code you could change the Basic start and end addresses to point to the beginning and end of your program and then use one of the new commands (except of course, the *RUN command). Unfortunately, I have not included any OPEN, CLOSE or PRINT commands to the DOS as this would have taken up valuable memory. Disk memory extends from $8700 to $FFFF (34560 to 65535).

Machine language programmers will notice that the DOS uses *all* the RAM under Kernal. Normally whenever the RUNSTOP/RESTORE combination is used, an NMI interrupt is triggered and one of the first things that it does is to restore all the default vector contents at $314. The routine to do this is situated at $FD15. This routine checks whether the vector contents are to be copied or restored and in the process it overwrites the RAM at $FD30 to $FD4F. Therefore any program residing here becomes corrupt and would be destroyed. I have overcome this annoying problem (bug ??) by redirecting the NMI vector to point to a special subroutine of my own, which when activated, avoids restoring the default contents of the vectors; thus never getting a chance to overwrite any RAM. Problem solved!

When using any of the new commands within an IF – THEN statement, always be sure that you take a small precaution. Due to the way the IF – THEN statement is structured, my commands will be executed no matter what the outcome of the IF part is. To avoid this happening, use a colon before any RAM disk command immediately following a THEN command, as follows:

```
10 IF A=1 THEN:*LOAD"PROG1"
```

To enter the program, type in the Basic loader supplied. To activate the new commands type:

```
SYS 32768
```

You should see a message stating the program title. When the RAM disk is initialised, all appropriate Basic pointers are lowered to the correct locations. Therefore, when first activating the routine, remember to user a CLR after the SYS statement to clear any variables that may have been defined.

And Finally

As you can see, this program provides most of the facilities of a disk drive, more so in terms of speed. The only command that may seem slow is the *ERASE command, but remember that it has to do quite a lot of memory moving everytime it is called. For this reason the program is totally incompatible with any program that uses RAM above 32768 in memory. The advantage to having a Ram disk is that you have a fast, reliable method of temporarily storing data and programs. It also provides a quick way of copying multiple programs by allowing you to store up to 11 files in memory at once and transferring them to another disk or tape one by one. I hope you find this program useful in your programming environment.

See listing on page 78

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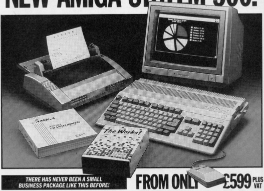

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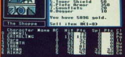
Bard's Tale II

A tankard of foaming ale placed in front of a Bard is a surefire way to get him to sing. Should you pay for the ale, there is an excellent chance that the exploits recalled in his ballads will be your own. That is of course, assuming that you survive this latest adventure.

The evil Archmage Lagoth Zanta has stolen the Destiny Wand and broken it into seven pieces. These he has hidden somewhere within the Realm, protected by hordes of his evil minions. Not only must you locate and reassemble the various segments, but also seek out a final encounter with the Archmage himself.

Your party of characters in this role-playing game from Electronics Arts can either be developed from scratch or transferred from the original Bard's Tale. Survival in the Realm does not come easily and many of your lesser characters will be lost early on. There is a starter dungeon for you to practise on but even for that, your party will need to be approaching twelfth level to stand a chance of surviving.


```
1.Long Bow        30
2.Arrows          65
3.Helm            25
4.Halbard         100
5.Tower Shield    50
6.Plate Armor     350
7.Gauntlets       20
8.Dagger          10

You have 5896 gold.

Sell item #(1-8)
```

```
  Character Name AC  Hit Pts  Spl Pts Cl
0 JONKWIL         1   90  79    0   0 Pa
1 GRIMBLING       1  112 110    0   0 Pa
2 Ogre            0   32  32    0   0 Il
3 CAUNTA          1   88  75    0   0 Hu
4 TARC            0   92  81    0   0 Ba
5 STANA           6   50  50   33  33 So
6 MIKA2           5   45  42   48  48 Co
```

There is the usual range of races and professions to choose from all with a selection of skills although the thief is probably the least useful character – traps are better disarmed using magic. At the start of the game, the various warrior classes will be of the greatest importance as you progress, magic tends to dominate.

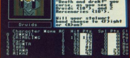
There are a total of 79 spells to choose from although naturally, you can only select a few to start with. Magicians come in several classes. You start off as either a magician or conjuror and can progress up through the ranks to sorceror, wizard and finally archmage. Some of the spells are truly awesome in their power – Mangar's Mallet causes up to 800 hit points of damage on every single enemy within 90 foot range of you. Needless to say though, the enemy are using similar tactics on you.

Combat is much the same as in the original game with the addition of missile combat although oddly enough, this is limited in range. You can't fire arrows at an enemy 40 feet away. Greater experience brings multiple attacks although you can't use these on several different opponents. Therefore if you inflict 23 points of damage on a six point goblin, your next two hits on the same dead beast are something of an overkill.

The game has been considerably enlarged on the original. Now there are six towns to explore plus a wilderness containing crypts and castles. One particular hut to search out is the Sage's Hut. He will relieve you of vast amounts of your money and in return, give you information which may or may not be useful to you. There are 25 different dungeons to be explored, all of which need to be carefully mapped as secret doors abound and one particular area missed could well mean the difference between success and failure. You will also need to find the spell point regeneration areas if your magicians are not to be rendered impotent.

The game itself plays very well and seems to be much better structured than the original. There are however a number of minor niggles which spoil an otherwise excellent game. Equipping characters and transferring items from one person to another is tedious and badly thought out. Another problem is that when you save your current position, the computer is reset and you have to load in from scratch again – a continue game surely would not have been too difficult to include. Similarly, the game can only be saved in one of the Adventurer's Guilds although there is one in every city. This has the tendency to prolong sessions as you have to backtrack through all the dungeons and reach safety before you can switch off.

These really are minor quibbles though and Bard's Tale II is still one of the three best role playing systems currently available. (Ultima and Alternate Reality are the other two.) An excellent game that will require hundreds of hours playing before the world is once more a safe place. **G.R.H.**


```
"Death and drek!" you
curse, as you see 6
Druids (10'), and 2
Mercenaries (10').

Will your stalwart
band choose to (F)ight
or (R)un?
```

```
  Character Name AC  Hit Pts  Spl Pts Cl
0 JONKWIL         1   90  79    0   0 Pa
1 GRIMBLING       1  112 110    0   0 Pa
2 Ogre            0   32  32    0   0 Il
3 CAUNTA          1   88  77    0   0 Hu
4 TARC            0   92  81    0   0 Ba
5 STANA           6   50  50   33  23 So
6 MIKA2           5   45  42   48  33 Co
```

Touchline:
Title: *Bard's Tale II – Destiny Knight.* ***Supplier:*** *Electronic Arts, Langley Business Centre, 11-49 Station Road, Langley, Nr. Slough, Berks SL3 7YN.* ***Tel:*** *0753 49442.* ***Machine:*** *C64.* ***Price:*** *£14.95.*

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The Light Brigade

Goodbye Disk Drives, Hello CD Roms

By Geoff Bains

Not only has the cassette tape nearly vanished from the realm of serious computing but the days of the floppy disk and Winchester also look numbered. All these present day mass storage devices are based on magnetic material which is, unfortunately their downfall.

Enormous though the 170K of storage available on a CBM64 disk may seem, it is not really large enough for the masses of information (especially high quality pictorial information) in common use on many computers today.

Micros with up to 4Mbytes of RAM are becoming relatively common. Equipping these with a floppy disk drive which requires a handful of disks and takes several minutes to fill the micro's memory is more than a little ludicrous.

Larger and faster permanent storage is obviously needed. The future of mass storage currently looks to be the optical disc which is usually seen as an audio compact disc.

Even at the most simple level, optical means of storing data are more efficient than the usual magnetic methods. The density of data from optical storage is much greater. You only have to look at a 35mm slide to see the kinds of densities possible – turn the idea around and imagine the disk space required to store a screen picture of that resolution.

The density of data in optical systems is finally determined by the wavelength of light itself (around one millionth of a metre for the light used). You can fit an awful lot of wavelengths into a small area and so fit in a lot of data.

However, the density of magnetic storage is limited not by the size of grains of magnetic material on the tape or disk (typically a few thousandths of an inch) but more by the size of the gap in the record/playback head. Even the Japanese, the minaturisation experts, cannot manage wavelength sized magnetic heads.

Of course, the practical methods of storing data optically do not come close to these theoretical densities, but already they get a lot closer than magnetic methods will ever manage.

The potential benefits of optical data storage have been known for some time and it was in 1967 that Philips engineers in Eindhoven, Holland came up with the beginnings of a practical solution. Their idea was meant for the storage of video and audio signals. A disc covered with marks detectable by reflecting a laser off the surface would be used. A disc was chosen as it was easier than a tape to move at a constant speed and could be stamped out in mass production.

The Philips invention turned into the Laserdisc video system. Although by 1972 Philips had demonstration machines on show and by 1978 (in the US) and 1982 (in Europe) the commercial machines were launched, the system could not stand up to the convenience of video cassette recorders and it has all but faded into oblivion. However, the Laserdisc has great potential, both for video and for storage of data.

The system uses tiny pits in the surface of a 12in disc to modulate the reflected beam of light from a laser shining onto its surface as it revolves. The pits are only about 1um (a millionth of a metre) across and arranged on a spiral track (like an LP) which makes about 55,000 turns around the disc, each track only 1.5um away from the next.

All this gives a data density of about 25,000 bits per inch – miles better than any magnetic media and giving around ten times the capacity of any Winchester.

Although the Laserdisc failed commercially, it served to develop the considerable mechanical problems of optical storage. The laser focusing lens reading the disk must be kept at exactly the right distance from the disc surface (within 0.25um) and the beam must follow the centre of the tracks to an accuracy of only 0.1um.

However, such mind blowing accuracies are obtainable and the money invested in Laserdisc technology has found rich rewards for Philips and Sony in the CD. It is the audio CD technology that forms the base of a whole new standard of computer data storage – the CD-ROM.

CD-ROMS are in many ways similar to standard CDs and the old Laserdisc. They use the same pitted surface technique for recording the data but are just 12cm in diameter. The disc spins to keep a constant speed (just over 1m/s) of the disc surface past the read head – so it must turn faster when the centre is being read (about 500rpm than the outer tracks (around 200rpm).

The laser beam is focused on the surface and the reflections focused onto a photodetector which can register the changes in light level as the pits spin past the lens. Each change of light level (the leading or trailing edge of a pit) represents a binary 1 and the flat areas between represent 0's. With pits as small as 0.3um, this gives data read speeds of 153.6Kbytes/s – a bit faster than a floppy disk drive!

The data is encoded to reduce the effects of reading errors – whether from scratches on the disc surface or glitches in the system. At these data speeds it only takes an error rate of one in a 100,000 to produce errors more often than one a second.

The data must also be carefully identified to enable accurate random access to be performed on the disc – so the computer can read data from a section of the disc directly, without reading all before it.

The data is split into frames of 28 8-bit bytes of data, one byte for timing and eight bytes of error correction. Ninety-eight of these frames are collected into a block along with 12 bytes for timing, 288 bytes for further error detection and four bytes holding the address of the block for random access. Each CD-ROM disc holds 276480 blocks – that's over 720Mbytes per disc.

The encoding against error detection is very complex and it closely follows the 'Reed-Soloman' encoding system used on audio CDs. As well as deriving checksum bytes for each frame of data (as do most digital cassette and floppy disk systems) this also involves interleaving the 28 bytes of data in each frame to split up any groups of bytes affected by errors (from, say, a scratch on the disc).

This system can successfully correct error bursts of up to 450bytes long (which would be a clearly visible scratch or mark). Combined with the additional error correction at block level (not found on audio CDs) the CD-ROM system has a rate of uncorrectable errors of just one in 10,000,000,000,000 – about one in every two years of constant access.

This kind of reliability has meant the CD-ROM is now taken seriously as a data storage medium. Mainframe computers have been using large optical discs (not unlike the original Laserdiscs) for some time and now CD-ROMs are entering the world of micros.

At the moment CD-ROMs are available only for IBM PC compatible machines and general works of reference are available on pre-recorded CD-ROM discs.

Hitachi is the main CD-ROM drive manufacturer at present. The Hitachi drive looks much like a disc drive and it loads a CD-ROM disc just like an audio CD player.

Microsoft has produced extensions to the MS-DOS operating system used on PCs to accommodate the CD-ROM drives and these are accessed in a similar way to a normal floppy disk drive.

The first commercial generally available CD-ROM software was made available recently by Microsoft. 'Bookshelf' is a single CD-ROM disc providing ten reference works for writers using PCs. A comprehensive dictionary is stored on the disk along with a thesaurus, a business information listing, a literary style manual and other useful tools for writers.

All this data costs just £225 – not bad for 1500 floppy disks worth of information available instantly at your beck and call.

Perhaps the most exciting future development of such a system is the incorporation of speech, music and adapt all on one disc with complete computer access and intervention in their replay.

However, although Microsoft is currently producing other reference works on CD-ROM, this is where the problem with the whole system lies. CD-ROMs are just like chip ROMs – they can only be read and not written to. Once the information is stored on the disc (by mechanically stamping them out) it cannot be altered or erased. A CD-Ram would be so much more useful – a system with the same speed and capacities but which could be written to by the computer just like a floppy disc or Winchester.

Writable optical storage discs have been available for about four years. Used only in research and large mainframes, these use larger 12in 18Gbyte discs with a thin coating of metal (only 0.05um thick) on the surface. As well as the usual low powered laser to read the disc a second more powerful laser is provided which can melt tiny pits into the metal film surface to form the pits which store the data.

By modulating the powerful write laser with the data from the computer, these discs can be written to with whatever data needs to be stored.

A similar system uses organic dyes on the disc surface. These require less power from the write laser to alter their reflectivity. ICI have recently announced 'Digital Paper' which uses such dyes coated onto a flexible base which can be used in the form of discs or even tapes with a 2400 foot reel (an average 12in diameter spool) holding 600Gbytes of data – enough to store three complete films in digitised form.

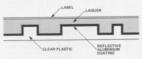
The WORM has Turned

However, once the data pits have been formed in the metal or dye coating on the disc surface there is no going back. The surface cannot be re-leveled or re-coloured and so the data is there for good. Such systems are called WORM drives – Write Once, Read Many times.

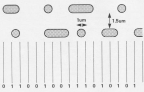
The 1Gbyte capacity of a CD WORM means that room can usually be found for altered data and the operating system instructed to ignore the outdated data on the disk. These systems are used in large databases for archive storages.

Truly eraseable optical disks are still almost exclusively found in research labs and two particular types are attracting the most attention. The first types uses a phenomenon known as the Kerr effect and a disk coating of gadolinium-iron-cobalt. This material has the effect of polarising light reflected from it in the same direction as it is magnetised.

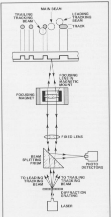
The disk is first magnetised and to


LABEL
LAQUER
CLEAR PLASTIC
REFLECTIVE ALUMINIUM COATING

CROSS SECTION THROUGH A CD DISC


1um
1.5um
0 1 1 0 0 1 0 0 1 1 1 0 1 0 1 0 1

PIT CODING ON-A CD-ROM

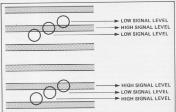

MAIN BEAM
TRAILING TRACKING BEAM
LEADING TRACKING BEAM
TRACK
FOCUSING LENS IN MAGNETIC MOUNT
FOCUSING MAGNET
FIXED LENS
BEAM SPLITTING PRISM
PHOTO DETECTORS
TO LEADING TRACKING BEAM
TO TRAILING TRACKING BEAM
DIFFRACTION GRATING
LASER

OPTICS OF CD LASER SYSTEM

write data onto it a powerful laser is used to heat the coating, which reverses the magnetic field at that spot. The reversal of polarised light from the read laser can then be used to detect the heated spot. The whole disk may then be erased of data by heating it again in a magnetic field to produce an evenly magnetised disk.

The second type of eraseable disc uses coatings of a tellurium-selenium alloy or gallium antimonide. These materials have the property of changing their crystalline structure when heated and this affects their reflectivity.

Again, a write laser produces hot spots of a temperature just above the melting point of the alloy coating on the disc surface, under the control of the computer. When the spots cool (almost immediately) they change their reflectivity and so allowing the read


LOW SIGNAL LEVEL
HIGH SIGNAL LEVEL
LOW SIGNAL LEVEL
HIGH SIGNAL LEVEL
LOW SIGNAL LEVEL
HIGH SIGNAL LEVEL

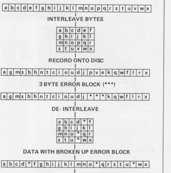
TRACKING ERROR GENERATION

laser to pick them up from then on. The whole disc can be erased by heating it to a temperature just below the melting point of the coating whereupon the alloy reverts to its original structure.

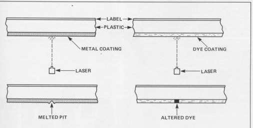
Philips have produced reliable eraseable discs using the Gallium antimonide coating which can be recorded and erased a thousand times without degradation.

However, with both of these systems, data cannot be overwritten. These are CD-EPROMs rather than CD-RAM. Much research is of course dedicated to finding a suitable material to use for CD-RAM. However, the future for optical storage already looks set. With units containing several drives with a total capacity of a couple of hundred Gbytes, the necessity for overwriting ceases to be really important.

For small systems and even home computers the CD-ROM will surely be a commonplace sight before very long, even before alterability comes along. The convenience and efficiency of vast quantities of data compactly and permanently stored and near-instantly accessible is too great a temptation for the micro industry to shy from for much longer. Then, of course, how about a game of 700Mb program hi-fi sound and video pictures...


a b c d e f g h i j k l m n o p q r s t u v w x
INTERLEAVE BYTES
a b c d e f
g h i j k l
m n o p q r
s t u v w x
RECORD ONTO DISC
a g m s b h n t c i o u d j p v e k q w f l r x
3 BYTE ERROR BLOCK (***)
a g m s b h n t c i o u d j * * * k q w f l r x
DE- INTERLEAVE
a b c d * f
g h i j k l
m n o * q r
s t u * w x
DATA WITH BROKEN UP ERROR BLOCK
a b c d * f g h i j k l m n o * q r s t u * w x

BREAKING UP ERROR BLOCKS BY INTERLEAVING

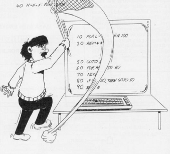

LABEL
PLASTIC
METAL COATING
DYE COATING
LASER
LASER
MELTED PIT
ALTERED DYE

WRITING TO WORMS

Basic Lister

Grab program lines off the screen without loading them into memory

By Stephen Burke



The C64's screen editor is very powerful as screen editors go, anything printed on the screen, be it listed from memory, or typed can be entered easily as a Basic program line simply by moving the cursor to the line, making sure there's a line number up front, and pressing Return.

The problems start when the program lines you wish to edit are not in memory, something else is. Basic Lister is a machine code program that allows you to list a Basic program stored on disk without having to load it into memory. This makes it easy to 'steal' lines or subroutines, etc, from another program, even merge and append programs.

The program is made up from three independent routines. The Basic lister can be used on its own, just use the syntax:

```
SYS49152,"filename"
```

To view the directory, you will need to type in the directory code. Simply use the syntax:

```
SYS49152,"$"
Or:
SYS49410
```

The final part is a wedge program purely for your own convenience, allowing you to omit the SYS and just use:

```
,"filename"
```

While the program is listing, you can use the space bar to pause; pressing RUNSTOP will halt the listing leaving the material on the screen for editing.

Should you try to list a non-Basic program, you will get the expected garbage on the screen and you might be unable to halt the listing. Should this happen, RUNSTOP and RESTORE followed by:

```
CLOSE2
```

will return things to normal.

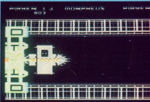
If you are using the comma ',' wedge though, it will need re-initialising with:

```
SYS828
```

Table 1 — Basic Lister Commands

SYS49152,"filename" to list a program
SYS49152,"$" or SYS49410 to list the directory
SYS828 to initialise the wedge
,"filename" to list using the wedge
Space bar pauses the listing
RUNSTOP halts the listing
RUNSTOP/RESTORE and CLOSE2 if program won't halt.

See listing on page 77



Morpheus

Morpheus

Morpheus

Before the world was created, two universes were forged together. They were equal but opposite; one being positive the other negative. On the border of each Aither (universe) was a nucleus – Morpheus which maintained the balance.

Small orbital pods surround the nucleus and keep the negative, positive charges flowing in harmony. Forever growing, learning and creating, the nucleus was fast developing into a thread.

Many time zones have now passed and the threat of the nucleus has become more apparent. A commercial operation is set up to destroy Morpheus before it gets out of control. If this were to happen the entire universe would be brought to a halt. The leaders of the universe join forces to organise a galactic operation recruiting young pilots to fly state-of-the-art space craft, in a bid to fight for the universe.

Well, as in most games you are one of the lucky pilots picked for the mission. To clear space from all nucleus' and nail Morpheus in a one-to-one final battle.

As this is a government project you can not afford to waste time and money, you have fifty time zones in which to get to level fifty; failing to do so will result in the game ending.

If you become bankrupt the research budget into new weapons and systems for your ship will stop. You need all the help you can get in the way of these, as progress is almost impossible without update equipment. So not only is this a difficult shoot'em-up, there is a fair bit of brainpower involved too!

To help you locate the orbitals and nucleus there is a scanner positioned at the top of the screen, (marked as a cross), this shows you any other nasties. As well as hostile aliens there are also rocks floating freely in space, that weaken your shield.

So now the time has come to show Morpheus who's boss and blow apart the first nucleus. You must shoot just one orbital, thus creating an imbalance within the two universes and killing the nucleus – easy?

There are 50 levels in this game, each one harder than the last, and as you progress you will need to buy more sophisticated weapons from one of the 60 on offer! You can also build your ship up to a huge craft almost filling the screen, but this takes time and money.

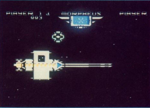
As you blast aliens your score is amassed and at the end of each level, it is transferred into money leaving your score intact. If you have a huge bundle of guineas and suddenly get napalmed don't worry, it is rounded to the nearest figure and carried over to the next game.

Well, that's basically the ins and outs, now to the play. Presentation is slick with many options available. Options allow you to save your high score and your game position, which is very neat.

What about the expensive asking price? Not a kind of sum the average Granny bashing kid could afford I'm sure, but the money for the great packaging has to come from somewhere!

Never-the-less, a great game, but having a Swiss bank account is a great help, please make cheques payable.... **K.R.**

Touchline:
Title: *Morpheus.* ***Supplier:*** *Rainbird Software, 74 New Oxford Street, London, WC1A 1PS.* ***Tel:*** *01-631 5373.* ***Machine:*** *C64/128.* ***Price:*** *£14.99 (Ca) £17.99 (Disk).*



Which Drive?

Disk drives come in all shapes and sizes, how do they measure up?

By Norman Doyle

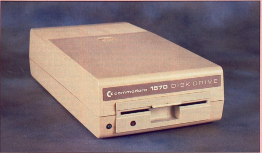
Once upon a time life was easy; choosing a disk drive for your Commodore meant the 1541. Now there are seven to choose from! Commodore have four - 1541, 1570, 1571, 1581 – and then there's the Oceanic, Excellerator + Plus, and Blue Chip 5.25. For C128 users the choice is simpler if full advantage is to be taken of the fast loading 128 mode, only the 1570 or 1571 will do.

Except for the 1581, all of the drives offer compatibility with the C64 5.25 inch disk system but is the saving offered by non-Commodore drives a trade off against full compatibility? What are the pitfalls and benefits?

Commodore 1541

The 1541 is the standard against which the others are to be judged. Based on the PET's old 4040 and 2031 system, the 1541 started life as the 1540 drive for the VIC-20 computer. With the launch of the C64, the 1540 was soon superceded by the 1541 whose major benefit was a streamlined case to match the colour of the C64, a few small mechanical changes and slightly improved speed.

A few ROM problems which appeared on the 4040 were imported through the 1540 to the 1541. The main problem being that the save and replace facility malfunctions when the directory fills an exact number of data blocks. It's a pity that Commodore



didn't grasp the opportunity to correct this fault. Even worse, the system still carries this bug through to the updated 1541D and the new 1570/71 drives.

Any reference to the 1541 is usually preceded by an adjective such as sluggish or snail's pace. Most drives for other computers load with the speed of a supermarket packer, the 1541 loads like a dock worker on go-slow. The speed problem is not caused purely by the electronics system, it is a restriction created by the physical constraints of serial loading.

A serial loader uses one communication wire so data is fed back and forth one bit at a time. If Commodore had employed the user port it would enable a whole byte to be transferred in parallel, giving an immediate eight fold speed increase. Systems such as Evesham Micros Dolphin DOS fast loader takes advantage of the user port and the improvement in speed is unbelievable.

One advantage that Commodore compatible drives have over others lies in the fact that they are 'intelligent'. This means that the DOS is held on board the drive rather than occupying memory within the computer itself. Consequently, the drive can be programmed and such facilities as spooling from disk to printer can be achieved without tying up the computer. This does have the

EXCELERATOR PLUS

disadvantage of making the drive larger than normal, but this is principally a result of the inclusion of the power supply inside the drive's casing.

The drives are supplied with good support software but the manual leaves a lot to be desired. The section on relative files in the old 1541 manual contains an example listing which is actually incorrect and has caused problems for users in the past.

Commodore 1570/71

These drives were developed for use with the C128 and, although they work with the C64, they are not advised as a substitute unless you're willing to accept that half of their capabilities will remain unused.

If you consider the C128 as two computers within the same shell, the 1570 drive actually contains three storage/retrieval systems and the 1571 has four!

Both drives have a fully compatible 1541 system but in 128 mode a special, faster system clicks into operation which can also be used for loading CP/M format disks and, with suitable software, it will format MS-DOS disks so that data can be transferred from C128 format to any MS-DOS PC and back again.

The extra mode in the 1571 arises because it can use both sides of the disk for storage without the need for flipping the disk. C128D machines have the 1571 drive fitted as standard.

The drive automatically selects 1541 mode when it is first turned on and it's the first access by the computer which decides whether normal mode will be continued for C64 use or whether fast transfer mode is used. The DOS does allow for the drive to be locked back into 1541 mode if desired.

The special facilities which permit MS-DOS and CP/M disks to be used relies on an advanced system of disks commands called burst mode commands which are also used by some standard C128 programs to enable even faster (faster than fast!) data transfer rates.

Some problems with the 1571 ROM have been discovered which can cause inconvenience to users under certain conditions. Most notably, serious problems have been experienced when two or more files are open simultaneously, writing to side two of the disk is often slow and spurious DEVICE NOT PRESENT errors are generated. Another problem, which Commodore cannot really be blamed for, is when flippy disks are used.

Normal one-sided disks actually have recording emulsions on both sides but only one notch is cut thus inhibiting use of the second side. As Commodore point out, flipping the disk over and cutting an extra notch has two potential disadvantages. Mechanically, a felt pad rides on the normally unused side of the disk and this can cause friction damage. The second reason stems from the fact that some of the single sided disks are rejected double sided disks.

The problem with the twin headed 1571 is that it tests each disk to see if it is formatted on each side and although it will recognise the difference between a double sided disk and a flippy, it is a process which can occupy the drives interest for quite some time.

A solution does exist for this problem in the shape of Financial Systems Software's 1571 Fix ROM (£24.95) which cures all of the major ROM deficiencies mentioned here and a few more besides.

Commodore 1581

This is a departure from the normal 5.25 inch system into the more professional format of 3.5in disks. The first question that arises is what benefit does a non-standard system offer that makes it worth while switching over when most software houses produce their disk software on 5.25 disks?

The answer lies in the capacity of the disk. Although smaller than the standard size, the new disks are more rugged and have a greater storage capacity. The 5.25 disks has 664 blocks available but the 3.5 disks have a capacity of 3160 blocks. In bytes this means 790K of available storage opposed to a mere 166K on the standard system.

For serious business users and programmers the advantage of such increased storage space becomes obvious and the deficiency of software should be relieved with the popularity of the machine in the States. FSS are looking towards their own interests by offering a range of software and 5.25 to 3.5 conversion software.

As a second drive (with device number switches!) for professionals I can recommend the drive and its full compatibility with both of the C128/64 modes and facilities. 1541 fast disk utilities will not work with this drive and using a cartridge can cause problems.

Excellerator + Plus FSD-2

This is probably the best known alternative to the 1541 but will not emulate the higher capabilities of the 1570/1. Although professing total compatibility with a 1541, the drive transfers data at a higher rate and is less than half the size of the Commodore machine, but the power supply is housed separately.

A recent competition hosted by Evesham Micros offered an Amiga for anyone who could find incompatible software and, although the results have not yet been made public, we know from phone calls to the office that some examples have been found but nothing of great significance.

This is the problem with varying from the Commodore brand. If the systems were identical to the 1541, a court case would probably result so there is always the faint possibility that compatibility problems could arise.

The construction of the Excellerator exceeds the 1541 in that the casing is metal and offers an excellent shield against electrical and some magnetic disturbances.

Multiple disk systems have always been a problem with both the 1541 and 1570/71 drives. To use a second drive its device number must be changed which means booting up a software alteration every time the system is powered up or by hardwiring an internal change which immediately voids the guarantee. Excellerator avoids this by having two switches situated under the drive which can allow any device number from 8 to 11 to be easily selected.

The main consideration is cost and the Excellerator offers considerable value. With a basic cost well below that of the 1541, Evesham are currently offering the GEOS system free with each drive.

Oceanic OC-118N

The Oceanic drive has a lot in common with the Excellerator – an awful lot! Housed in an identical casing with identical sockets and switches it would be hard to tell the difference between the two.

As a reviewer this posed me with problems; should I review the same machine twice, discuss the merits of the company logos or delve deeper? Peering through the disk slot I could observe a slight different chassis in the Oceanic drive, so equipped with a screwdriver I delved deeper.

The internal construction of the mechanics of the drives is noticably different and I thought that the Oceanic system looked more resilient and it lacked the clacking sounds characteristic of the Excellerator. Electronically, the circuit boards look very similar with a few telling differences.

There is only one thing that worries me slightly. I know that the Excellerator + Plus is an improved, more compatible version of the Excellerator Plus so which version does the Oceanic drive approximate? Could it be the earlier Plus? Here my knowledge gives out neither company could give me a reliable answer and looking at the circuit boards the Oceanic has a higher code number than the + Plus. I will continue my investigations and try to ascertain the truth. In the meantime I'm afraid that my answer is that I don't know.

Blue Chip 5.25

Datel's machine is twice the size of the Excellerator/Oceanic drive but considerably smaller than the 1541. The advertising blurb proclaims a greater compatibility with the C64 than the 1541D, a side swipe at some of the introduced bugs in the updated 1541 machine.

Blue chip certainly looks as if it has more in common with the 1541 than it has with the other drives and possesses a more reliable locking system on the disk slot (the key latch). With the exception of the 1541, the drives all have a key latch which must be swung into position after inserting a disk. This ensures that the drive mechanism engages effectively and prevents the user from wrecking a disk by pulling it out while the drive is in use.

One problem I have found with the Excellerator and Ocean drives is that the key latch can be swung into position when the disk is still 0.25 inches from full insertion into the drive. In a hurry, it is possible to trap and damage a disk but with the Blue Chip the disk is only about 0.125 inches out of true and the mechanics safely pull the disk into position if the key latch is operated too soon.

One less attractive feature which this drive shares with the 1541 is the inaccessible device number changer. If something other than device 8 is allocated, the drive casing is removed, a wire or two clipped and then the drive is reassembled. To undo the change presents a delicate soldering job which would have been avoided if proper switches had been employed.

Which Drive?

Before discussing which drive is the best, there is room to mention Commodore's 1551. This was intended as an alternative drive for the C16/Plus4 systems and offered parallel data transfer with vastly increased speeds. I've never actually seen one and I can't find records of any being sold but it's a pity that Commodore didn't investigate this style of machine for the C128.

Back to the real alternatives. The Commodore drives offer assured compatibility with C16/Plus 4, C128 and C64 computers but suffer from higher prices. All of the other drives claim faster data transfer than the 1541 but, as the tests show, this did not appear to be the case. I'd like to see the results of each company's tests.

Both the Oceanic and the Excellerator offer GEOS in their price but although the Excellerator is £10 cheaper it does not include the traditional offer of software with the Oceanic disk. Dimensions have two offers, a purchaser can choose between accepting five adventures plus five arcade games or the Easyfile Database and Future Finance Planning Package.

I can find little to choose between the machines. For C128 users the choise is limited to 1570/71/81 but for C64 owners any of the machines would do. As a great fan of the speedy Dolphin DOS system my choice would still be a 1541 and careful searches through the want-ads can reveal second hand machines for as little as £80.

If your decision is based on design then the Blue Chip offers a classy, sturdy though slightly bulky finish but my favourite is still the Excellerator/Oceanic drives because of their compactness and external switches.

Drive Comparison Table

MACHINE	PRICE	SIZE(mm) L W D	SUPPLIER*
1541	£159.95	370x200x100	Delta Pi Software 8 Ruswarp Lane N Yorks YO2 1ND Tel: (0947) 600065
1570/71	£189.00	370x200x100	Delta Pi Software
1581	£199.95	230x140x65	Financial Systems Software 2nd Floor Anbrian House St Mary's Street Worcs WR1 1HA Tel: (0905) 611536
Excellerator +Plus	£129.95	275x150x50	Evesham Micros 63 Bridge St Evesham Worcs. WR11 4SF Tel: (0386) 765500
Oceanic	£139.95	275x150x50	Dimension Computers 27/29 High Street Leicester LE1 4FP Tel: (0533) 517479
Blue Chip	£139.99	290x170x75	Datel Electronics Units 8/9 Dewsbury Road Fenton Industrial Estate Stoke-on-Trent Tel: 0782 273815

Byting into the 6510

In previous articles we have designed a simple wordprocessor. Now we want to send the textfile to the printer and save it onto disk or tape

By Burghard-Henry Lehmann

The problem with computers is that things are not as straight forward as you would like them to be.

Take for example your average video recorder. Most people have no problem operating a video recorder, because it has a play button for replay, a record button for recording things off the telly and a stop button for stopping either.

What could be more straight forward – except for the technically incompetent, who are worried to press any button, in case the whole thing might explode...

But with computers things are much more complicated. With a computer you get a very confusing looking keyboard and on that keyboard they are no keys marked "Play" or "Record" or "Stop". Nor is there a "Start-the-Printer" key.

So how do you operate your disk drive or datasette or printer?

Flexebility

In previous articles I have frequently talked about the importance and advantage of flexibility in computing.

A video recorder, to return to our example, is so straightforward as it only has a limited amount of quite specialised functions. You want to be able to record something off your TV with it. You want to be able to replay what you have recorded, and so on.

A computer on the other hand is an extremely versatile data processing device which you can use for all sorts of purposes (including running your video recorder), some quite obvious tasks, like typing text onto the screen or sending data to a disk drive for storage or sending text to a printer, to get a hardcopy. Also some not quite so obvious purposes such as operating a robot!

But how is this flexebility achieved? It's surprisingly simple. The computer is given data (input), and then it is programmed to do something with that data (processing), and the result of all this is an output of data, and where this output goes to and what happens with it entirely depends on what you've got connected to your computer and to which output device you want it to go.

In other words, the output of a databyte "1" can result in the letter "A" being printed on the screen or that letter being printed or stored on a disk. Or it can result in the arm of robot being lifted or on a more devasting note – a nuclear missile being launched and the nuclear holocaust being started.

The microprocessor, which I have identified at the beginning of this series as the real computer, doesn't give a damn about what happens with the data it outputs. It just processes the data and then sends it on its way, as programmed. The result is entirely up to what happens at the other end.

Back to Brass Tacks

In previous articles we developed a simple wordprocessing program. Now we want to store the textfile, which this program creates onto disk or tape, retrieve it from disk or tape and, finally get our printer to give us a hardcopy of it.

I've decided to put all this into one article, because, as you will see, the operations are surprisingly similar. This brings me back to what I initially said.

In terms of output the disk drive or the tape recorder or the printer are nothing more than different output devices. As far as the 6510 microprocessor is concerned they are no different in any way to the screen or the memory.

All we do is send the data which the microprocessor produces, to a different stream or channel. And this is really all there is to it!

Back to our Program

But as always in this series, let me explain matters further to you with the help of practical routines. You'll find the listings of those routines at the end of the magazine.

As a matter of fact, I'd like to show you two different ways of saving our textfile and loading it back in. That is, two different ways for all you lucky owners of disk drives. Because the disk drive is far more versatile for serious applications than the tape recorder.

The third and the fourth routine – Tape Save and Tape Load is for those of you who only get a datasette, but they can easily be modified to work on disk too. The first and the second routine Save File and Load File on the other hand will work only with a disk drive. But they are by far the more versatile as I will explain later.

Save File

The first and the second routine are also very good to illustrate the point I made at the beginning of this article: all we really do is send data to a different output channel than the usual or receive data from a different input channel.

To explain what I mean, let me give you a very short program which you can enter in less than a minute (that is, if you're using my assembler, *Speedy Assembler*).

```
10 ORG 49152
20 LDA 'A
30 JSR $FFD2
40 RTS
```

All this routine does is load the ASCII-code of the letter "A" into the accumulator and then calls one of the most often used routines in the ROM of the C64 which is called "CHROUT", which is short for: "character out".

This means, the character contained in the accumulator is sent to the current output device. And if you haven't given any directions to the contrary, the current output device is always the screen. In other words, the character contained in the accumulator is printed on the screen, and to be precise, at the next print position.

As you might have guessed by now, this is the same as if you would give the BASIC instruction: 'PRINT "A" '. As a matter of fact, the BASIC interpreter uses the above Kernal routine every time a PRINT instruction is given.

All we want to do now is send our data to a different output device, namely the disk drive. We want to print not onto the screen, but onto a diskette.

And to do this we have to open the correct output channels. This is what lines 150-300 in our Save File routine do.

In lines 170-200 I tell the system which filename I want to use and how long it will be.

First of all I load the length of the filename into the accumulator. (The actual length – 8 bytes – is given at the end of the routine before the ASCII-codes for the actual filename. This is of course not a very flexible method and I'd like to encourage you to design a routine which allows the user to enter a filename of his own.)

Secondly, I put the low byte of the start address of the filename into the X-register and the high byte into the Y-register.

Finally, I call the appropriate routine in the Kernal – called "SETNAM", which is self-explanatory – which actually initiates the filename I've given.

Next I set the channels I want to be opened. Then, I load the logical file number; in our case three into the accumulator.

Next, I load the number of the output device. I want to be used, into the X-register. In our case this is 8, which is always the device number for the first disk drive. If you want to send the data to a second or a third disk drive you have to give the device number which that drive has.

Now, I load the number of the secondary address in the Y-register. (If you are not too sure about all this, I advise you to consult your disk drive manual. The purpose of this article is to show you how things can be done in machine language. If you know what the BASIC-statement 'OPEN 3,8,1' does, you know what all this is about, because we are doing exactly the same thing here!)

In line 250 I call another Kernal routine – called SETLFS which initiates those values. Then I open the file whose parameters I have initiated in lines 170-250.

Finally I tell the system that I want some output to be done. For this I put the logical file number, first given in line 220, into the X-register and then call a routine in the Kernal – called "CHKOUT" — which opens the proper output channel.

Now the system is set up to send data to the disk drive instead of the screen. The following routine, lines 320-600 sends the actual data of our textfile to the disk drive. And note that once more, this is exactly the same procedure as if I had sent the data to the screen!

Lines 380-430 initiate the beginning of our textfile and at the same time send the low byte and the high byte of that address to the disk drive. Therefore I store the start of loading address onto disk. This is of course important for later on, when we want to retrieve the data from disk – except, if we used "forced loading" which would load the data to the start address we would give.

I don't think I'll have to spend much time to explain lines 450-600 to you. The working of, what I call "OUTLOOP", should be pretty clear to you by now. "OUTLOOP" simply sends 1000 bytes – a full screen – to the disk drive. This is of course not terribly sophisticated, and I think you will replace this routine very quickly with something better. That is, something that relates more to our wordprocessor and saves only the characters actually written.

One way of doing this is by using the variable "TEXTFILE" as the limit for saving.

Another way is by writing a short routine which puts an end marker – let's say 0 – at the end of the textfile. Then all you have to do is insert the line "BEQ EXIT" after line 480 and lines 550-600 can be erased.

Finally I close all the channels I have opened in lines 170-300. This is in order to put output back to normal again – that is to the screen.

First I load the logical file number into the accumulator and call a routine in the Kernal which is called CLOSE. This closes the output channel.

In fact, I could open a different output channel now which I had initiated beforehand and which might go, let's say to the printer. Or I could open an input channel to get data from a disk which I then process and the result of which I send back to the disk drive, by again opening the output channel as we did in lines 290-300. This would be useful for a data base program, where data is retrieved from the disk, processed and new data sent back to the disk to be stored.

But in our case we can close everything and put it back to normal. This is what line 670 does, which calls on another Kernal routine, named CLRCH, which is short for 'clear channels'.

Load File

In the next routine 'Load File' we do the opposite of what we did in our first routine. We retrieve the data we've stored onto disk.

Lines 190-320 open the appropriate input channel from the disk drive.

Lines 360-390 get the start address, we've stored before, from the disk and initiates the beginning of our textfile.

Lines 440-510 get the data itself.

To determine the end of this loop, I use "ST" which is the socalled status variable of the C64. This variable is located at decimal 144 (Hex 90) and is updated after every input or output operation. In the case of input from the disk drive it tells when the end of the file has been reached. In this case ST will contain 64, otherwise it contains 0.

Lines 560-590 close the input channel and clear all channels, as we did in the first routine.

The rest of the routine reprints the textfile onto the screen by converting each byte into its appropriate screen code and outputting that directly to screen – as we've done before.

Again, the disadvantage of this routine is that it is not very sophisticated in that it fills the whole of the screen, which means that you will get alot of garbage after your textfile. But I trust, you've learned enough by now to write a better routine and also tie the whole thing properly into our wordprocessor. So that after the textfile has been reprinted, the user can continue straight away to enter more text.

Tape Save

The third and fourth routine I've written for all you datasette users out there. But they can also easily be modified for disk use and thus demonstrate another, less versatile way of saving and loading data onto disk.

All you have to do, if you want to use these routines for disk use, is change the device number in line 190 and line 210 respectively.

Lines 130.210 in the Tape Save routine do exactly the same thing as in the Save File routine. Only that we set now different logical files, because we want to output to the datasette.

We do not need to open or later on close anything, because we will be using the Save routine in the Kernal which will do all that and send the data on its way.

All we have to do is tell the system where our textfile starts and where it ends.

The low byte and the high byte of the start address is loaded into a zero page location of our choice and then the number of this zero page location is loaded into the accumulator to tell the system which location we've chosen to point at the beginning of our textfile (lines 250-290).

Next, the low byte of the end address of our textfile we put into the X-register and the height byte we put into the Y-register.

And this is all there is to it. Line 360 calls the actual saving routine in the Kernal.

Tape Load

The fourth routine again does the opposite of what we did in the third routine. Therefore, it is similarly structured and needs very little explanation, except for two points.

The Kernal Load routine is also used for varifying a file on disk or tape. Therefore we have to tell the system, what we want. If we load a zero into the accumulator (line 200), it will load the file from disk or tape. If, on the other hand, we put a one into the accumulator, the appropriate file on disk or tape will be compared with what is in memory and at the end we will be told if it verifies or not.

This is done by either setting or clearing the carry flag. If the carry flag is clear, it has verified. if it is set, it hasn't.

Lines 290-300 simply tell the system where we want the file to be loaded to, if we are using the so-called forced loading, which loads the file to that address and not the one given on disk or tape.

After I've called the Kernal Load routine which does the actual loading (or verifying), I test the carry flag to see if an error has occured (line 380).

If carry is set at this point, it can mean several things. The right file hasn't been found on disk or tape or the loading process has been interrupted with the break key or – in the case of varifying – it doesn't varify.

In this case we jump straight to the exit of our routine in line 1230.

Otherwise, if carry is clear, which means that the file has been loaded correctly, we reprint the textfile onto the screen with a similar routine as used in the Load File routine.

Printer Routine

Sending our textfile to the printer, as we do in our fifth routine, is really the same as sending it to the screen or the disk drive or the datasette. Again, all we are using is a different output device, namely the printer.

To open the appropriate output channels we of course don't have to give a filename. So we put a zero into the accumulator, which signifies 'No filename' (lines 170-180).

Lines 200-280 open the appropriate channels to the printer and need no further explanation.

Lines 320-360 initiate the start of our textfile.

In line 390 I send a carriage return to the printer, which is a good idea at the beginning of every printer routine, because it empties the buffer in the printer of any garbage which might be left over from the last printout and positions the print head at the beginning of a new line.

For this I use a ROM routine which saves me two bytes. Because I could do the whole thing like this:

```
LDA # 13
JSR $AB47
```

($AB47 is a short cut to the CHROUT routine which we've used in our "Save File" routine.)

I don't have to explain much about the main print loop in lines 450-600, except for one thing.

In lines 460-470 I send a so-called printer control character to the printer, and I do this every time before sending the actual letter to be printed.

This is an instruction to the printer to do the printing that follows in a certain specified way, that is enhanced or reversed or bold or whatever.

To find the proper control character for what you want to do, you have to consult the manual of your printer. I've got an Commodore MPS 1000 printer which I use in our routine in its Commodore mode. And since I want the text to be printed in lower and upper case (business mode) I tell the printer to do so by sending the control character 17 before each letter to be printed.

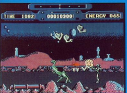
Line 640 sends a final carriage return to the printer in order to empty the printer buffer and get the rest of the textfile printed. (Again this routine is not very sophisticated and will print some garbage after the actual text, because 1000 bytes are sent to the printer. But I am quite sure you will have enough knowledge by now to mend this unsatisfactory state of affairs.)

See listing on page 71

RIMRUNNER

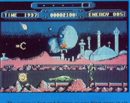
Far, far away from the systems of man, at the very edge of the galaxy, uninhabited planets are colonised by a race of Insectoids. Because of the constant attack from the metallic stormtroopers of the Arachnoids the Insectoids protect their colonies with force shields powered by generators. However, these generators need constant support to maintain their charge and that's why the elite force of Rim Runners were formed.

As a Rim Runner you're armed with a pump action laser rifle and supplied with four reptilian mounts, known as Runners. If one gets shot all you have to do is whistle and another comes running to replace it. The Runner is a good stead and will carry you at great speed through the landscape, but will do nothing to defend itself against the Arachnoid Attack.



This attack comes in a variety of deadly critters ranging from fireballs and boulders to a bizarre collection of chomping and mashing machines. These must be shot using your laser rifle as any collisions will cost either you or the runners valuable energy. You begin the game with 100 units of energy and each collision costs you five units, knocks you to the ground and costs you valuable time to recover. The Runner has only six stamina units but only loses them one at a time. When the last one has gone it collapses in a heap, dissolves into a skeleton and then disappears. After a short delay another Runner is at your side and you're on your way.

Although you can move faster on the Runner you must dismount to re-energise the spent generators by discharging your laser rifle into them. These look like mushrooms that hover above the ground and appear as green dashes on your colony display at the top of the screen. As the Arachnoids attack the protective bubbles, the generators drain and fall to the ground as the dashes flash and then turn red. Your mission is to maintain these generators for an allotted time period that also doubles as a bonus. If you succeed you're immediately transferred to a new colony and a tougher mission.

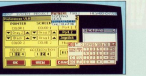


The action is fast and furious as you blast away in six directions at the attacking Arachnoids, and is played on a sideways scrolling background and accompanied by impressive sound effects as lasers fire, generators are recharged and as either your or the Runner collapse on the ground. Even the high score table adds to the game as you punch up your name by shooting the letters.

Rim Runner was designed by Barbarian author Steve Brown and features the same mixture of great graphics and addictive gameplay. **T.H.**

Touchline:
Title: *Rim Runner.* ***Supplier:*** *Palace Software, 275 Pentonville Road, London N1.* ***Tel:*** *01-278 0751.* ***Machine:*** *C64.* ***Price:*** *£8.99 (Ca) £12.99 (Disk).*

KEEP IT SIMPLE!


ABOUT SYSTEM PROJECT UTILITIES TOOLS MEGABENCH V1.0
NOTEPAD
CLOCK
PREFERENCES
CALCULATOR
Preferences V1.0
POINTER
SCREEN
COLOR 1
Gray 2
Black
COLOR 2
Gray 3
Gray 1
Port 1
Port 2
Joystick
VELOCITY
ACCELERATION
1 2 4
OK
VIEW
CANC
NOTEPAD

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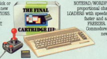
THE FINAL
CARTRIDGE III

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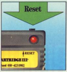
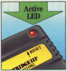

Reset
RESET
ARTRIDGE III
and 010-4231982


Active LED
RESET
RIDGE III
31982

Freezer
FREEZE
THE FINAL CAR
H&P Comp. Holland

The following windows are already implemented in ROM:

PREFERENCE WINDOW
Selects: mouse port, joystick port, mouse speed, screen colours, pointer cloars, keyboard click, keyboard repeat.

CALCULATOR
Complete simulation of a LCD-calculator. Input either with mouse, joystick or keyboard. The numeric key-pad of the C128 can be used in C64-mode.

NOTE PAD
Easy to use wordprocessor with proportional characters enables you to store and print smal notes, letters, etc.

DIRECTORY WINDOWS
Enables you to open directories from different disks and drives, sort and print directories.

DISK WINDOWS
Load, Run, Rename, Validate, Scratch, Initialize, Fast format disks.

TAPE WINDOW
Activates fast and normal modes.

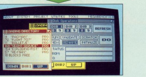
PRINTER WINDOWS
Select different printers, such as Commodore serial, Centronics, RS 232, Colour printers.

REQUESTER WINDOWS

DISC BASED USER WINDOWS

CLOCK
Real Time Clock, with Alarm.

WINDOWS


ABOUT SYSTEM PROJECT UTILITIES TOOLS MEGABENCH V1.0
Disk Operations
LOADING
LOADING DIRECTORY
9 "PACMAN" PRG
72 "FLIGHT 707" PRG
11 "BALLETJE" PRG
168 "SILENT SERVICE" PRG
154 "EXPLODING-FIST" PRG
57 "HE-MAN" PRG
18 BLOCKS FREE
DOWN
DIR 1
UP
DIR 2
UP
DIR 1
DIR 2
DIR 3
8 9
REFRESH
RUN
VALIDATE
SCRATCH
NEW
RENAME
INITIALIZE
DO
STATUS:
FROM:
TO:

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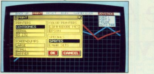
The high-resolution bit mapped windows are selected from a menu bar. An unlimited number of windows can be open on the screen at the time. The windows can be freely moved on the screen.

FREEZER MENU


BACK UP
PRINT
RESET
RUN
GAMEKILLER
JOYSTICK
PORT I
PORT II
MOUSE
AUTO FIRE
PRINT
PRINTERS
CENTRONICS
SERIAL
RS 232
COLOR PRINTERS
COMMODORE MCS
EPSON
SCREENDUMPS
LARGE
SMALL
BANNER
SPECIALS
SPRITES
CHAR SETS
OK
CANCEL

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Innovative hardware, combined with smart software, allow you to freeze and continue every well-known C64-program.

Freezer options include:

CENTRONICS/SERIAL/RS 232 SCREENDUMPS
● Full A4 printing ● Variable printsize ● Colour printing ● Sprite printing ● Reverse printing ● Colour changes.

GAMEKILLER
● Kills sprite to sprite ● and/or sprite to background collision ● Can be started at any point in your game.

AUTO FIRE
● Transforms a normal joystick to an advanced auto fire engine.

JOYSTICK PORT CHANGER
● Never blow up your computer again by changing joystick ports while the C64 is running.

BACK UPS
● Disk to disk ● Tape to disk ● Disk to tape ● Back up files are packed and reloadable without the Final Cartridge III ● 60K in 15 sec. (disk) ● Exits to Monitor or Basic.

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Functions include:
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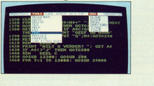
PULL DOWN MENU


FUNCTIONS
TOOLS
TYPE
PRINT
DESKTOP
DISK
VERSION
RENUMBER
AUTO
DELETE
OLD
HELP
KILL
FIND
REPLACE
MONITOR
24K EXTRA RAM
DLOAD
DSAVE
DRUN
DIRECTORY
TLOAD
TSAVE

```
1350 CLR                $=W$+" ":    NEXT
1360 FOR
1370 GOS              THEN GOTO1
1380 GET              IF ASC(Q$
     THE              INT "GEEF UW NAAM"
1390 GOS              PUT "Q";N$:GOTO290
1400 RET
1410 REM      DEEL B
1420 PRINT "WILT U VERDER? ": GET A$
1430 IF A$<>"J" THEN GOTO200
1440 REM    DEEL C
1450 GOSUB 12300: GOSUB 280
1460 FOR T=1 TO 12000: GOSUB 29000
```

THE FINAL CARTRIDGE III®

Almost all commands and functions that are not activated by windows can be selected from a menu bar, which appears on top of the screen after pressing the fire button, either in Basic or from the freezer. The following Basic Toolkit and keyboard extra's are included:

● Renumber ● Auto ● Delete ● Old ● Help ● Kill ● Find ● Replace ● 24K extra RAM for Basic ● Append ● DAppend ● DSave ● DOS ● Monitor ● Drive monitor ● Sprite editing ● Centronics interface ● Fast format ● Low Res screendumps ● Plist ● Scrolling up and down ● Stops and continues listings ● Programmed functionkeys ● Packer/Cruncher ● Hex to decimal conversion ● Pokes, syscalls and variables may all have Hexadecimal values ● Trace, Dump, Order, Mem.

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Decisive Battles of the American Civil War

Without any preamble, I'd like to say that this is the most impressive disk-full of code that I've seen marketed in a long, long, long time (which is actually a pretty sad comment on the software scene).

The first offering, in this country anyway, from the **Australian Strategic Studies Group; this is a package that,** unlike many, lives up to its portentous sounding title. Here we have the chance to play through six major battles of the tragic war between the States, from the first encounter at Bull Run to the vast and complex melee of Chancellorsville.

Six games on one disk would be good value in itself, but SSG have also been generous to include the complete authoring system, with which all the game scenarios were produced, on the same disk. They cannot lose by this, because apart from pleasing the public, this is battle scenarios.

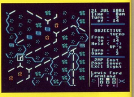
First of all, let's look at the battles, SSG has gone to considerable trouble to inject as much realism as possible into the usual wargame process of shoving icons around the screen. For a start, the opponent's units cannot be seen unless they are in line of sight with yours, or they are in territory you have controlled. This sounds unremarkable, but almost every other computer wargame I have seen makes the opponent's deployment totally visible, which is about as unrealistic as you can get.

Next, the company has thought about the whole process of military command and control as it was practised in the 1860s. Although units can be commended individually, as if by radio, switching this off means that orders can only be issued to the troops from your army HQ via intervening levels in the hierarchy – corps and division HQs. Of course these may be out of communication if out of range of mounted messenger, and terrible problems can ensue because the wretched corps/division commanders may not have very good ideas of their own.

In short, the game creates the whole 'fog of war' to which **19th century** commanders were subject. Even if you get a command through, there's no guarantee that a commander, who may be impulsive or cautious, will obey it. A lot depends too, on whether they have good staff.

It's definitely better, however, to play each of the battles for the first time as though each unit had radio, since this gives you some sort of feeling for the ebb and flow of the battle, particularly if, like me, your knowledge of the Civil War is entirely obtained from reading Gore Vidal's Lincoln.

The program frees the player from choosing targets and ordering retreats in minute detail. Units will to a large extent look after themselves, so that you are involved largely in fighting a war of position, just as it should be.



Although Decisive Battles looks a lot better than many of its rivals, such as SSI's strategy games, unfortunately, like the SSI offerings, it does betray the fact that it's a conversion from an Apple II package – no smooth scrolling or joystick control, for example. On the other hand, it does use a proper map based on hexes. Most computer wargames are grid-based, which doesn't work out quite right.

The documentation for the game is lavish, including a glossy full-colour map, menu diagrams for the forgetful, and a 72-page **manual.** This is particularly necessary if you are to understand the game generator, which comes in two parts, Warplan and Warpaint.

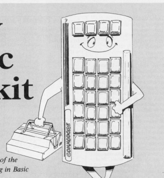
Warplan is the most important of the two. With this, you can design the battle map and set up all the units on both sides. A very large number of parameters are necessary for this, but it's a relatively painless process. Maps can be up to 27 × 27 hexes in size, but I couldn't find any mention of a limit on the number of units.

Warpaint is the cosmetic part of the program. With this, you can modify the appearance of any of the icons used to represent terrain, units, or anything else. Terrain can be redefined with its effect on movement, cover and visibility in Warplan. In short, the authors have thought of just about everything. I cannot commend this package too highly.**F.F.**

Touchline:

Name: *Decisive Battles of the American Civil War (Vol 1).*
Supplier: *Strategic Studies Group UK, Court House, 15 Court Hill, Chipstead, Surrey CR3 3NQ.* ***Tel:*** *07375 53600.*

Easy Basic Toolkit



Tired of Basic V2.0?
Let Easy Basic take some of the strain out of programming in Basic

By N. Higgins

Easy Basic is a comprehensive Basic toolkit package for the Commodore 64. It doesn't matter if you're just getting started or you've been at it for years, there's something here for everybody. This allows you to build up a collection of your favourite subroutines and incorporate them easily into the program you're working on. More on this later.

There are many varied extra commands for Easy Basic which makes a HELP function essential. Typing HELP at any time will produce a detailed command summary. I mention this at the beginning in case you can't be bothered to read any further – at least you'll have a rough idea how to get started.

A note on memory usage. Easy Basic uses the RAM under the Basic ROM and the $C000 – $CFFF area. Any Basic program that doesn't use this RAM should run quite happily within Easy Basic.

The Basic Toolkit contains many of the commands no programmer should be without, such as:

AUTO (start, step) This is the command to commence automatic line numbers. For example: AUTO100,10 will start producing line numbers from 100, and incrementing by 10 each time you enter a line. To turn off auto-line numbering, simply press return over an unused line number.

REN (start,step) This command is complementary to Auto, and it will quickly renumber part or all of a program including GOTOs and GOSUBs.

DEL (start,end) This will likewise delete a range of line numbers. Omitting the second parameter will erase everything from the line specified by the start parameter onwards.

FIND (text) If you should want to search a program for a particular keyword such as PRINT or GOTO etc; this command will search the Basic program and report all occurences. If you should want to find an occurence of a text string such as a message or REM statement, enclose the text to be searched for in quotes:

```
FIND"MAIN MENU"
```

Syntax errors are always cropping up and so using the SHY command will list the offending line ready for re-editing. This also applies to other errors, including the error which occurs after pressing RUNSTOP.

VAR will dump all the variable names and their current values to the screen. This can be very useful when debugging a large program. The program must have been RUN before using this command.

OLD is simply the reverse of NEW. Typing OLD will restore a program after you have typed NEW, and very often even after a cold start (reset).

INFO is used to display the locations of the vital bits of your program:

- the start of Basic text
- the end of Basic text
- the beginning of variables

- the end of variables
- the beginning of arrays
- the end of arrays
- the beginning of strings
- the end of strings
- the memory used by variables
- the memory used by arrays
- Basic bytes free

NAME"prg name" and DATE"date" sets the name of your program and the date. This is particularly useful if you have several versions of a program and you want to find the most recent version. Note that the program name can be up to 14 characters long, the last two characters are used as prefixes relevant to other commands. The date needn't follow any particular format, it needn't even be the date! As long as it's not longer than 17 characters.

Wouldn't it be useful if the various bits of a program could be a different colour when listed? The command is Colour (line,colour 0-15). The number refers to the colour you wish that part of the listing to be. When listed, everything after the specified line will appear in the specified colour. It works by adding a new line containing a REM statement and some special characters. Make sure you don't erase an important program line.

The LIST command has been augmented, pressing ' @ ' will save you typing LIST every time, and you can pause the listing with the spacebar – any other key re-starts and RUNSTOP halts the listing.

Disk users have not been forgotten. DIR will display the disk directory of device 8, without over-writing Basic. Spacebar and RUNSTOP function as for LIST.

To load a file from the directory (no need to type the file name), simply cursor up to the relevant entry and type @ L before the program name, and press return. No messing about! Alternatively, @ L"filename" will achieve the same result. Note all disk commands default to device 8.

Saving a program is slightly more complex. Using @ S on its own will save your program using the filename specified by the NAME command (you can check this at any time using the INFO command). Alternatively, @ S"filename" results in the same.

DOS"disk command" can be used to send a command to your drive, DOS on its own will read the drive's error channel. For example; DOS"RO:JIM=0;FRED"will rename a program called FRED and call it JIM.

Easy Basic Command Summary

AUTO(start,step)	Begin auto line numbering
REN(start,step)	Renumber the program
DEL(line,line)	Delete range of program lines
FIND(text)	Search for keyword or text string
WHY	Display line for editing after ERROR
VAR	Display used variables and values
OLD	Restore a NEWed program
INFO	Display program locations
NAME"prg name"	Set name for program
DATE"current date"	Set date
COLOUR(line, colour 0-15)	
@	Set list colour
	List
DIR	Get disk directory
@L"filename"	Load program
@S	Save named program
DOS"disk command"	Send command to disk drive
APP"filename"	Append a file
MERR"filename"	Merge program lines
BSAVE"filename",8,1,SA,EA	Save block of memory
BLOAD"filename",8,1,SA,EA	Load block of memory
PROTECT"filename"	Write protect a disk
HTAB(1-39)	Set tab value for F5 and F7
VTAB(1-24)	Set tab value for F1 and F3
SWITCH	Select user-defined function key assignments
KEYF(1-8)"text"	Set function key assignments
DUMPD,SA	Display memory in decimal
DUMPH,SA	Display memory in hex
DEC,(0-65535)	Convert decimal to hex
HEX,($0000-$FFFF)	Convert hex to decimal
LIB	Display subroutine library index
LIBF"subname",line,line	Save subroutine
LIBD	Delete subroutine from library
LIBS	Save Library
LIBL"filename"	Load Library
DEVICE(1=tape,8=disk)	Select disk or tape storage
KILL	Kill Easy Basic
HELP	Display command summary

APP"filename" (append) and MER "filename" (merge) are very useful for incorporating pre-written subroutines in a program under construction. Append merely tags the new program on the end of an existing program in memory. It is highly likely the line numbers of the appended program will fit the new program, so use the REN command to re-number. Merge is similar, except that it will replace line numbers in the original program where they coincide.

The 64's Basic has no facility for saving blocks of memory, so the next couple of commands rectify this.

BSAVE"filename",8,1,SA,EA will save the memory to disk between SA (start address) and EA (end address) while BLOAD"filename",8,1,SA will load a block into memory starting at SA (start address).

PROTECT"filename" is a special command that saves a program in memory in a protected format. This means that when the program is loaded back, you won't be able to list it (the machine will reset), and the RUNSTOP key is disabled thus preventing prying eyes getting a look at your work! There are a couple of restraints here; your program must start at the normal Basic start (2049), you must have at least 80 bytes free, and you musn't have used line 0.

The function keys can be set up to make things easier for you, Easy Basic automatically defines the function keys in the following way:

F1 – moves the cursor 12 rows up
F3 – moves the cursor 12 rows down
F5 – moves the cursor 20 columns left
F6 – moves the cursor 20 columns right

You can set the number of places the cursor moves using:
HTAB(1-39) and VTAB(1-24)

The shifted function keys are defined as follows:

F2	pauses Basic
F4	returns the current cursor position
F6	moves the cursor to the bottom left corner of the screen
F8	Toggles quotes mode on/off **N.B.:** Don't use F2 to pause Basic while accessing disk!

If you wish to define your own function key assignments, you will first need to SWITCH from preset mode to user-defined mode. Now you can use KEYF(1-8)"text" to assign up to 30 characters to each key. Using SWITCH again will return you to the preset assignments.

To dump the contents of memory on the screen, use the following commands: DUMPD,SA will dump memory to the screen in decimal, from SA (start address) onwards. DUMPH,SA similarly dumps memory in Hex. To dump the basic Rom to a printer, you can enter:

```
OPEN4,4:CMD4:DUMPD,40960
```

Pressing RUNSTOP will terminate the dump, Print #4:CLOSE4 will return things to normal.

If converting Hex to Decimal gives you grief, DEC(0-65535) will display the corresponding Hex equivalent while HEX (0-FFFF) performs the reciprocal function.

The Subroutine Library, as mentioned earlier allows you to save a separate file containing a list of the subroutines used in a program. The name of the library should correspond to its name on the disk (or tape), to make for easy loading. You can then load the subroutine straight from the library using @L, APP or MER. All the commands associated with the subroutine library are prefixed with LIB. To insert a subroutine into the library, use LIBF"name",start line,end line. LIB can be used to check what files are included in the library, while LIBD will delete an entry. LIBS will save the library using the name set with the NAME command, while LIBL"filename" will load a library back.

Even though Easy Basic was designed with the disk user in mind, the tape user has not been forgotten. To change the default device from disk (8) to tape (1), you can use DEVICE1. Likewise, DEVICE8 will re-select the disk drive.

KILL can be used to return to regular 64 mode, and a tap of the RUNSTOP and RESTORE keys will reactivate Easy Basic.

Getting it all in

Type and save SAVER, EASY BASIC and LOADER by:

```
POKE 43,0:POKE44,9:POKE2303,0:
NEW
```

Load and run LOADER. Replace DEVICE in line 43 with 1(Ca) or 8(Disk). Next, load and run EASY BASIC, and type NEW. Without resetting the machine, load SAVER. Before running, cassette users should type POKE 40715,1.

Finally run the SAVER program. This creates the file called EASY BASIC V1.1".

To load EASY BASIC, run the program called EB LOADER. The files SAVER, EASY BASIC and LOADER are no longer needed once you've tested EASY BASIC.

See listing on page 83

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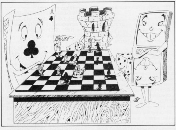

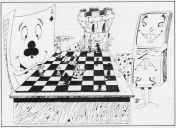

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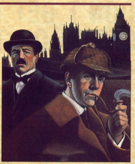


SHERLOCK

The world's greatest consulting detective is the latest hero to be recreated in Infocom's classic style. However, in the mystery of the Crown Jewels, Sherlock Holmes discovers it is a trap organised by the evil Professor Moriarty to capture him, so he decides it is best to let you, Dr Watson, take control of the case. As the game begins you know none of this as you are summoned by the loyal Mrs Hudson to help the great man out of a deep depression. Armed with your C64 and trusty disk drive you rush to 221B Baker Street.

Infocom packaging has become a legend in its own loading time and Sherlock is no exception as the double-sided game disk is backed up by a full instruction book, a map of Ye Olde London Towne, a useless but decorative Sherlock and Watson key ring and a copy of the June 17th, 1887 Thames. This authentic looking paper is packed full of notices covering everything from births to deaths, changes of name and new publications as well as the report on the Cambridge University v Sussex cricket match. All this adds to the atmosphere but means little as the game loads and you are lead by Mrs Hudson up to the apartments of Sherlock Holmes.

As with all Infocom adventures you are faced with a series of puzzles that must be solved to reach a perfect score and finish the game, and I have no intention of spoiling this process by telling you any solutions. However, if you get really stuck you could resort to the cowardly way out and delve into the on-line 'instruction' for a helping-hand or an answer. These bring their own problems as you can spoil the game if you use them too much and they have been written to send a casual looker on wild goose chasers! One thing is certain, you are on your own as although Holmes trails along he refuses to help, but can clarify some points and even guides you in the right direction. This is, perhaps, just as well as Holmes is at his most infuriating as he immediately pounces on a small item in the newspaper that you've already read and starts you off on a race against time to recover the crown jewels.

This trail of mystery and confusion leads you all across Victorian, fog-bound London (some Americans still think London is like this!) where you can either walk, which takes time or call a cab. One of the initial problems you have to solve is how to avoid calling the enthusiastic but useless growlers (that always take you to the wrong place) and hail the more efficient cabs.

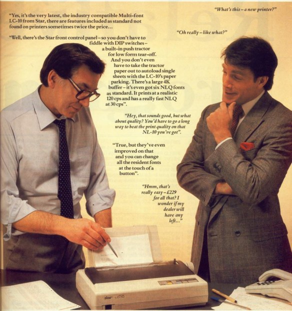
Once you've solved that you may get round to deciphering the riddles left by the Crown Jewels thief that will lead you to a mapping problem and a series of challenges, a rendezvous, a rescue attempt and finally victory at the Palace. On route you will have to juggle useful and useless objects, find clues, then work out how to get them (this isn't always easy) and even solve the odd medical emergency since, after all, you are supposed to be a Doctor.

The game is populated by the usual blend of humorous but infuriating characters, such as a librarian that distracts you with a constant stream of very interesting facts, a bank guard who is adamant that he can't be bribed and of course, Holmes.

Sherlock is an excellent game that oozes atmosphere and quality from its superb text descriptions and compelling but frustrating plot. Another one for the collection. **T.H.**

Touchline:
Title: *Sherlock.* ***Supplier:*** *Infocom/Activision, 23 Pond Street, Hampstead, London NW3 2PN.* ***Tel:*** *01-431 1101.* ***Machine:*** *C64.* ***Price:*** *£19.99 (Disk Only).*

"£229 for all that?"



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LCYC6

Relative Program

We have one loose end to tie up from the first part (February '88) in which the routines to set up a file were discussed, with the FIELD details in two arrays, FIELD$ and FIELD. However, once the computer is switched off then those details are lost. So we have to store these on a file to be read back whenever the program is run for that particular file. For this we use the good old sequential file:

BASIC 3.5 + – HOUSEKEEPING

First of all, we need to create a unique filename for the housekeeping file which is based on the relative file but which will not interfere with it on the same disk. We put the filename NAME$ in between HSE. and a row of full stops, and then take the leftmost sixteen characters of the whole string, which will form the unique housekeeping filename.

```
200 n1$=LEFT$("HSE."+"........",16)
```

Then the sequential file is OPENed for a write:

```
210   dopen  # 3," @ "+(n1$),w:
gosub 3610
```

And write the first of the many variables we will need to update the file after each file access. We will PRINT # the number of FIELDs in this particular file, the Variable C, and check the error channel.

```
220 print  # 3,c:gosub3610
```

Then the loop is opened and the FIELD AND FIELD$ arrays are PRINT # 'ed to the File.

```
230 for a = 0 to c
240 print #  3,FIELD$(a):gosub3610
250 print #  3,FIELD(a): gosub3610
260 nexta
```

We ensure that the file is closed with a DCLOSE and then we RETURN.

```
330 dclose:gosub3610
340 return
```

Other housekeeping variables will be added to this routine as we progress: there has to be provision made for keeping track of the number of RECORDs in the file, those deleted and so on. Notice the use of the " @ "in the DOPEN statement. This is the over-write symbol so that the housekeeping can be updated on the file after accesses have changed the data. You will also see that in line 280 we have made this a subroutine with the RETURN command. This is because this routine may be used for creating a file and also updating an existing file when leaving the program.

The read housekeeping routine must be an exact duplicate of the write, in reverse, as it were, otherwise you will get data input errors.

```
350 n1$=LEFT$("HSE"+NAME$    "........
",16)
360 dopen#   3,(n1$),r:gosub3610
370 input #  3,c:gosub3610
380 for a = 0 to c
390  input #  3,FIELDS$(a):gosub
3610
400 input #  3,FIELD(a): gosub3610
410 next a
420 dclose
430 return
```

BASIC 2

In BASIC 2 you have to be careful with those commas. The 1541 disk drive manual has itself made an error with the commas which took me many hours to solve before I could get sequential files to work properly, so don't use the manual, use this article!

BASIC 2 – WRITE HOUSEKEEPING

```
200 n1$=LEFT$("HSE"NAME$+
"........",16)
210 open2,8,2," @ 0:"+nl$",s,w":gosub
3610
220 print #  2,c:gosub3610
230 for a = 0 to c
240 print #  2,FIELD$(a):gosub3610
250 print #  2,FIELD(a): gosub3610
260 nexta
270 close2:gosub3610
340 return
```

Don't forget to OPEN the channel 15 first, otherwise the disk error check routine 3610 will cause a '61,FILE NOT OPEN' error. I think I can now

e File

ming

Learn the correct method of using relative files by following our series. The second installment deals with how to write and read to records on the file

By Eric Ramsay

rely on you understanding that, and perhaps OPENing the Error channel right at the beginning of the program.

BASIC 2 — READ HOUSEKEEPING

```
350 n1$+LEFT$("HSE"+NAME$
+"........",16)
360 open2,8,2, "0:"+ n1$ +",s,r":
gosub3610
370 input #  2,c: gosub3610
380 for a = 0 to c
390 input #  2,FIELD$(a):gosub3610
400 input #  2,FIELD(a): gosub3610
410 nexta
420 close2:gosub3610
430 return
```

The read housekeeping would obviously only be used for loading the details of a previously created file. After branching to it, you would GOSUB to the FIELD pointers routine, and then everything would be set to Read and Write to the RECORDS.

Read and Write Records

Since you may well be using the same program to create many different files, you will want the Read and Write routines to be flexible. You might wish to have one file with three FIELDs and another with twenty in each RECORD so the best method is to use a similar Loop as to the suggested FIELD length input routine in the first part.

The actual method and presentation on the Data Write into RECORD is up to you, but I will suggest some routines you may find useful. Whichever method you use, you must ensure that the FIELDS are the correct length to match the FIELD pointers already calculated by the program. One suggestion I might make is the following. We can use the same loop as the FIELD Input routine used in the first part. First we increment the RECORD counter, RN, and then null the collection string, DISK$.

```
2510 rn=rn+1: rem****increment Rec
              no
2520 disk$=""null the collect string
    Then we start the loop and clear
the screen.
2525 for a = 0 to c
2530 print(clrscreen)
    And we display the details relevent
to this particular FIELD
2535 print"Enter FIELD";a+1;
" Subject ";FIELD$(a)
    And receive the data with the
INPUT
2540 inputfs$
    Now we add the FIELDString to
the collection String DISK$
2550 disk$= disk$ + fs$
```

And continue to collect the next String until the RECORD is complete.

```
2560 next a
```

There, how was that. Will that do? Well, no. We have relied on the user to type the FIELDs in and they can be of any length, and clearly that will not do. The FIELDs must always begin in exactly the same place in every RECORD or the display of the RECORD will not work. On the other hand, we could add a carriage return character, CHR$(13) to the end of each FIELD. but the problem there is that the FIELDs will still be of irregular lengths, and what is more, a separate Read operation would be necessary for every FIELD rather than a maximum of two for each RECORD. So we have to add a padding to ensure that every FIELD is exactly the right length. This is not too difficult if we declare a string full of spaces, call it PAD$ right at the beginning of the program:

```
10 pad$="
":pad$ =pad$+ pad$:
pad$+pad$:rem***pad$now=
80 spaces
```

That should be long enough. Now we use the length of the FIELD already contained in FIELD() inside the routine:

```
2545 fs$=left$(fs$+pad$,FIELD(a))
```

....and every FIELD as it goes through the loop would be of exactly the length stored in the array FIELD(). Now when the loop has finished for every RECORD, the collection String

DISK$ would be exactly the same length and we will be able to split up each DISK$ for display and processing without several Read operations.

Of course, when writing your own routine, you might wish to include details of how many characters are available in each FIELD as it is inputted. My own programs use a reverse bar on the screen on which each character of the FIELD is shown as it typed and automatically stops INPUTTing when the FIELD length is reached. It also edits out illegal characters from the keyboard input to prevent confusion, but that is really outside the scope of this article.

So now we have the RECORD ready for writing in the string DISK$. We have one more check to make. Supposing that, on the 64 the length of the RECORD is greater than 88 characters? Only 88 characters can be inputted by a single read from the disk, which would mean that some of the RECORD would be missing. Now we come to the separators again.

BASIC 7 — Collecting the Record

If we were to separate every FIELD with a carriage return CHR$(13) then we would have to read every FIELD separately, since a READ operation would stop as soon as it reached the first carriage return character in the RECORD. This would also mean that you would lose one byte of the RECORD for every FIELD, which can be very wasteful if you were to have 30 FIELDs. What we must do (only if the RECORD exceeds 88 characters for the 64 and 160 characters for the 128) is to split up the DISK$ at a standard place and then read the RECORD on either side of the separator. Before we can write the string to the RECORD we must check for the length of the string.

```
2565 if1rec > 159thengosub3592:rem
**** special FIELDS
```

The length of the RECORD, you remember, is stored in the Variable LREC and this line detects if the length of the RECORD exceeds the maximum permitted in the buffer. The following routine will now separate the String DISK$ into two parts by a CHR$(13) so that the RECORD will be read in two parts. The Write Routine is not affected, and the FIELD Pointers Routine has already detected this change in the RECORD Length. (Refer to part one.)

```
3591 rem **** special case for 1
rec  > 159
```

First the leftmost 159 characters of the string is put into D1$ and a carriage return, CHR$(13), is added.

```
3592 D1$=left$(disk$,159)+
chr$(13)
```

Then whatever is left of DISK$ is put into D2$, using MID$.

```
3594 d2$=mid$(disk$,160/ Len(disk$))
```

Then both D1$ and D2$ is added together and the end result is put back into DISK$, which now has a CHR$(13) in its 160th character.

```
3595 disk$=d1$+d2$
3596 return
```

The collection String is now ready for writing to the RECORD in the File.

BASIC 2- String Collection

The 64 gives us twice this problem, since the buffer can only handle a maximum of 88 characters in a single read from the disk. Since it is conceivable that you might have a RECORD of 254 characters, 254/88 is 2.8, meaning that for a full-sized RECORD you would need two separators.

If at this point you decide to use a separator for every FIELD I would understand, since at the beginning I used this method, and I will give you the routines you need now. There are only a few changes, starting with the FIELD pointers routine:

BASIC 2 - Field Pointers with Field Separation

```
3520 rem **** calculate FIELD
pointers
3530 1rec=1
3540 for a = 0 to c
3550 1rec = 1 rec+FIELD(a)
+1:rem *** note extra byte here
3560 fpoi (a+1)=1rec
3570 next a:fpoi(0)=1
3580 1rec=1rec+1
3590 return
```

As you should see an extra byte is added to LREC at each FIELD, and of course, there is now no need for a length of RECORD test, except for the maximum permitted.

String Collection with Field Separators

```
2510 rn=rn+1:     rem****
increment Rec no
2520 disk$=""    null the collect
String
2525 for a =0 to c
2530 print(clrscreen)
2535 print"Enter FIELD ";a+1;"
subject ";FIELD$(a)
2540 inputfs$
2545 fs$=left$(fs$+ pad$,FIELD(a))
2550 disk$=disk$+ fs$ +chr$(13):rem
***note the separator
2560 next a
```

Both of these routines will work perfectly well, albeit slightly slower in reading from the disk. The speed of the writing operation is unaffected since in every case the writing operation is carried out in one operation. This is very satisfactory bearing in mind that the 1541 and the 1571 actually write much slower than they read. In case you are stubborn and you still want to program a full-length RECORD in the three reads, here is my suggested solution. 128 owners, avert your gaze. This is why you paid your extra money!

BASIC 2 – Full Record in Three Reads

Calculate FIELD Pointers for three reads.

```
3520 rem **** calculate FIELD
pointers
3530 1rec=1
3540 for a = 0 to c
3550 1rec = 1rec+FIELD(a)
3560 fpoi (a+1)=rec
3570 next a
3580 fpoi(0)=1
3581 iflrec < 88 then 3590
3584 1rec=1rec+1
3585 iflrec < 175 then 3590
3588 1rec=1rec+1
3590 return
```

String Collection for Three Reads

```
3591 rem **** special case for 1rec
 > 88
3592 d1$=left$(disk$,87)+
chr$(13)
3593 d2$=mid$(disk$,88,1en(disk$))
3594 disk$=d1$+d2$
3595 iflrec < 176 then return
3596 d1$=left$(disk$,175)+chr$(13)
3597        d2$=mid$(disk$,176,len
(disk$))
3598 disk$=d1$+d2$
3599 return
```

You might have noticed that in both the above routines, the collection strings DISK$ remains totally unaffected if the total RECORD length does not exceed the buffer limitation. This programming may seem unnecessarily complex, but it does save many bytes which are just wasted in separating FIELDS when this is not strictly necessary. Owners of a 128 have a better time than those on the 64, but still, once the routines are in place you will not be aware that they are in fact processing the strings, apart from a slight decrease in speed. But why all the hassle? You will see now why we have gone to so much trouble to collect all the FIELDs into one string for writing.

BASIC 3.5 + –Writing the Record

We saw earlier the routine for collecting all the FIELDs into one string, DISK$. This may or may not contain a separator but whether it does or not has no effect on the write operation. First, we have to add a line to the very beginning of the input routine:

```
2490 rem ***** enter records
***********
2500 dopen # 5,(name$),l(1rec),d0,u8:
gosub 3610
```

The relative file is opened. LREC is not strictly necessary now since the file has been created, you may include it if you wish. Here I have also shown two optional statements, the d0 is the drive number, always 0 with 1541 and 1571 drives, and the device number, U8. if you want to use two drives you may change the U parameter to nine in which case the second drive will be writing the file., We can now read or write to any record merely by quoting the record number. First of all, we will increment the record counter RN, and then the next part of the routine is the FIELD collection routine you saw earlier:

```
2510 rn=rn+1:
 rem**** increment Rc no
2520 disk$=“” null the collect
String
2525 for a =0 to c
2530 print(clrscreen)
2535 print“Enter FIELD”;a+1;“
Subject ”;FIELD$(a)
2540 inputfs$
2545 fs$=left$(fs$+
pad$,FIELD(a))
2550 disk$=disk$+ fs$
2560 next a
```

Then we have the check for the RECORD length.

```
2570 if1rec > 159thengosub3592:rem
**** special FIELDS
```

This is an important part. Here the program is assigning a variable, WREC, from the record counter RN before it branches to the write RECORD routine. This is so that the same write record routine may be used by any part of the program. You will see the importance of this in later articles in the series.

```
2580 wrec=rn:
2590 :
2600 gosub 4080:rem ***** write
record
2630 print“Enter another record (y/
n) ?”
2640 getkeyyy$:if yy$ = “y” then
2510
2650 dclose
2660 goto menu wherever you place
it.
```

The program branches from the input routine to the write record routine. At last we are writing something to a RECORD!

```
4070 rem *** write RECORD routine
4080 record # 5,(wrec),1:gosub 3610
```

Here the variable WREC gives the RECORD number required, in parenthesis, and the last ,1 on the RECORD$ statement is the byte number of the RECORD to begin writing. This can be any part of the RECORD, but our write has to be at the beginning:

```
4090 record # 5,(wrec),1:gosub 3610
4100 print # 5,disk$:gosub 3610
4110 return
```

Do you see the simplicity of it? Because we have gone to the trouble of collecting the string DISK$ together we can simply declare the RECORD number and write the single string onto the RECORD. This is very quick, especially on the 1571. Even when all the FIELDS are separated with CHR$(13) the RECORD can still be written in one operation. The only difference will come when it needs to be Read.

BASIC 2 – Record Write

A slight change must be made to the routine for the 64. The essential details are there already, but we have to remember the record pointers routine, so the write record routine itself will be different:

```
2490 rem ***** enter records
***********
2500 open # 5,8,5,name$:gosub 3610
```

The relative file has already been opened, so even in BASIC 2 the record length does not need to be specified. Now we can use whichever string collection routine may be required; either the read in three or the FIELD separation method:

```
2510 rn=rn+1       rem****
increment Rec no
2520 disk$+“” null the collect
string
2525 for a = 0 to c
2530 print(clrscreen)
2535 print“Enter FIELD “;a+1;”
Subject “;FIELD$(a)
2540 inputfs$
2545 fs$=left$(fs$+
pad$,FIELD(a))
2550 disk$=disk$+ fs$       rem** +chr$
(13) for separate FIELDs.
2560 next a
```

If the read in three has been used we need the check for record length:

```
2565 if 1rec > 87 then gosub3592
2580 wrec=rn:
2600 gosub 4080:rem ***** write
record
2630 print“Enter another Record (y/
n) ?”
2640 getkeyyy$:if yy$ =“y” then 2510
2650 dclose
2660 goto menu wherever you place
it.
```

BASIC 2 – Record Write routine

This routine may be used from anywhere in the program, providing that the variable WREC is declared as the desired RECORD number to access. First we obtain the high and lo bytes of the record, using the routine already explained in part 1:

```
4070 rem *** 64 Write RECORD routine
4080 rp=rn
4082 gosub4114   rem *** get Record Pointers
```

Then the record pointers are placed in position, twice for safety, using the command channel:

```
4084 print # 15,"p"+chr$(101)+chr$(lo)+chr$(hi):
gosub 3610
4090 print # 15,"p"+chr$(101)+chr$(lo)+chr$(hi):
gosub3610
```

And the collected RECORD string is written to the RECORD.

```
4100 print # 5,disk    :gosub 3610
4110 return
```

You will see the usual rule followed there: the pointers are placed by the command channel, and the actual data is read from the RECORD using the file OPENed. (You did remember to open the error channel, didn't you?)

While the record write routine will always place the DISK$ on the RECORD correctly, you must not try to mix the different string collection or FIELD pointers routines. Each of them, either the three read system or the FIELD separation technique give different results for LREC and mixing the type of string collection will result in a 51,OVERFLOW IN RECORD error. You may check at any time after the string collection that the whole program is setting things up correctly, if you press the RUNSTOP key, and then type in direct mode:

```
?disk$
```

You will then see the RECORD as it is about to be written on the file. Now, test the LENgth of the RECORD Collection String. Again in direct mode, type:

?len(disk$)

and the result will be a number. This number should be one or two less than the Variable LREC, (or even three less if you are using the BASIC 2 Read in three method. If it is less than that then you are wasting file space and the FIELD pointers routine is not working correctly. If len(disk$) is equal to or greater than (= >) LREC this will result in an Error 51 when the program reaches the Write Record Routine.

Record Read – BASIC 3.5+ 2 Read Method

Now we come to the routine which will read the RECORD, which is not quite as simple as the write routine. I have written the routines required for either the two read method or the FIELD separated method, whichever you have decided to use for your own applications. Be warned however, that once having decided to use one or the other, you must stay with that method throughout the program, using only those routines which apply.

If you try to mix a two read method or FIELD separated method then you will get all sorts of errors and you will be left with garbage on the screen when it comes to displaying the RECORDs.

To read the RECORD I have assumed that you have OPENed the file. Don't forget that once OPENed a relative file may equally be read and written to. I assume for the moment that you wish to use the two read method, rather than separating all of the FIELDs. If so, then the routine you need is as follows.

You must have declared a variable, RREC as the RECORD number you wish to read, in exactly the same ways as the WREC in the write routine. In the next articles I will suggest many routines to make the display of the RECORDs in a file easy and efficient, but for now I shall use a simple request for a Read:

```
2730 print(clrscreen)
2740 input"Which Record to Inspect";n
2750 ifn  rnthenn=rn   rem *** check for valid no
2760 rrec=n
2770 disk$="": gosub 4130
```

At this point a RECORD number has been INPUTted, checked to make sure that it exists using the RECORD used counter, RN, and then the RREC has been declared. Now we come to the RECORD read routine. The file as already been OPENed so we go straight to the read.

```
4120 rem **** read record routine *******
4130 record # 5,(rrec),1:gosub 3610
4140 record # 5,(rrec),1:gosub 3610
```

The file pointer has positioned the read/write head to the correct RECORD number. Now the entire RECORD is INPUTted into the DISK$.

```
4150 input # 5,disk$:gosub 3610
```

But what if the RECORD is greater than 160 bytes? This means that only the first 160 characters of the record would have been read from the file, so we detect the length of the RECORD using LREC:

```
4152 iflrec < 159then return
```

If LREC shows that the RECORD is within the limits of the buffer, then the routine RETURNs. If not, it continues with the second read, which is why I have called this the two Read Method. The RECORD pointer now places the read/write head on the 161st character of the RECORD, since the 160th Character will be a CHR$(13). It then inputs the rest of the RECORD into a second, temporary String, dk$

```
4154 record # 5,(rrec),161:gosub 3610
4156 record # 5,(rrec),161:gosub 3610
4158 input # 5,dk$:gosub 3610
```

Now the entire RECORD is contained in the two strings, and they are simply concatenated, (joined together) to make the full string. The CHR$(13) is no longer part of the string because it cannot be INPUTted within a read:

```
4159 disk$=disk$+dk$
4160 return
```

BASIC 2 – Record Number Acquisition

Using exactly the same routine to obtain the desired read as above:

```
2730 print(clrscreen)
2740 input"Which Record to Inspect";n
2750 ifn > rnthenn=rn   rem *** check for valid no
2760 rp = n:gosub 4114: rem
*** get Record Pointers
2770 disk$="":gosub 4130
```

.. except that for BASIC 2 we need to obtain the RECORD pointers first, in line 2760. The variable RP, as the chosen RECORD number variable will then calculate the RECORD pointers in the 4114 sub-routine. When it RETURNs from that the pointers Hi and Lo have been calculated.

BASIC 2 – Record 3 – Read Method

We now have to program our own

version of the RECORD READ routine for BASIC 2 and the 88 byte buffer:

```
4120 rem ****Read RECORD
Routine – BASIC 2
4130 print # 15,“p”+chr$(101)+
chr$(lo)+chr$(hi):
gosub 3610
4135 print # 15,“p”+chr$(101)+
chr$(lo)+chr$(hi):
gosub 3610
4140 input # 5,disk$:gosub 3610
4145 iflrec < 88then return
```

Here you will see that there is a new CHR$ statement at the end of the usual pointer lines. This is the offset, just the same as the last number in the RECORD # statement in Basic 7. Since the 88th character is now a chr$(13), the next character position from which to be read is 89, hence the CHR$(89) as the offset:

```
4130 print # 15,“p”+chr$(101)+
chr$(lo)+chr$(hi)
+chr$(89): gosub 3610
4135 print # 15,“p”+chr$(101)+
chr$(lo)+chr$(hi)
+chr$(89): gosub 3610
4140 input # 5,d1$:gosub 3610
```

If the read operation is over, we add the two strings together and RETURN.

```
4145 iflrec # 176thendisk$=disk$+
d1$:return
```

If not then we read the 3 String:

```
4150 print # 15,“p”+chr$(101)+
chr$(lo)+chr$(hi)
+chr$(177): gosub 3610
4155 print # 15,“p”+chr$(101)+
chr$(lo)+chr$(hi)
+chr$(177): gosub 3610
4160 input # 5,d2$:gosub 3610
```

And then add all the strings together to make up the whole Disk$.

```
4165 disk$=disk$+d1$+
d2$:return
```

When this routine has RETURNed into your main program the whole of the RECORD which you have chosen to view will be in the collection string, DISK$. To see it you may write another line:

```
2780 print disk$
```

and what the program has read will be displayed. However for processing, unlike the FIELD separated routine we need another short routine to Read the Disk$ into the array. DISP$().

Here it is:

```
4170 rem **** read records into
FIELDS
4180 fora=0toc:disp$(a)=
mid$(disk$,fpoi (a),
FIELD(a)) :nexta
4190 return
```

We will be using this routine extensively in the next of the series.

In the next article I will show how to program the RECORD display routines. But before we leave this subject, we have to program the FIELDS separated method for those who decided against the two or three read method.

BASIC 7 – Fields Separated

If you have decided to use the FIELD separation method of writing the RECORD, you will need a different type of READ routine altogether. This is a loop; the same loop we saw earlier, but inside a RECORD read routine.

Why is this necessary? Well, each of the FIELDs on the RECORD now have a CHR$(13) after it, meaning that a read operation starting from Byte 1 of the RECORD would only read as far as the end of the first FIELD.

What we have to do is loop the read routine so that it returns to the RECORD to read from the 1st byte of the RECORD. This is why the FIELD POINTER routine has to be different; it has to allow the extra character represented by the CHR$(13) to the Pointer for each FIELD. In actual fact, the routine is quite simple:

```
4120 rem **** BASIC 3.5 FIELD
Separate Read RECORD
4125 disk$=“”:for a = 0 to c
4130 record # 5,(rrec),(fpoi(a)):gosub
3610
4135 record # 5,(rrec),(fpoi(a)):gosub
3610
4140 input # 5,disp$(a):gosub 3610
4150 next a
4155 return
```

I am sure this routine is clear to you, but in case it isn't I'll explain it. Line 4125 nulls the collection string ready to begin and begins the familiar FIELD Loop. Then the RECORD # statements not only select the correct RECORD but also selects the position from which to read it, which is contained in the FIELD pointers array, FPOI(). The FIELD data is read into the array DISP$(). For this reason you will need to DIMension this array in a suitable line at the beginning of the program:
10 dim disp$(c)
or you will get a program error 'BAD SUBSCRIPT ERROR' which would not show itself until you selected more than 11 (0-10) FIELDS.
Additionally, you are now not able to display the RECORD using the statement PRINT DISK$: you have to use a Loop:

```
fora=0toc:print disp$(a)nexta
```

.. instead. Much more to come on Display Routines next in the series.

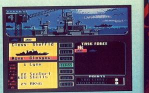
BASIC 2 – Field Separation Read Routine

The general rules of the BASIC 2 Field Separation Read technique is very similar. In fact, you should actually be able to work this out for yourself, but in case you are not yet a programmer, here it is:

```
4120 rem ****FIELD Separate Read
RECORD Routine –
BASIC2
4125 fora=0toc
4130 print # 15,“p”+chr$(101)+
chr$(lo)+chr$(hi)+chr$ (fpoi(a)): gosub
3610
4135 print # 15,“p”+chr$(101)+
chr$(lo)+chr$(hi)+chr$(fpoi(a)):gosub
3610
4140 input # 5,disp$(a):gosub 3610
4150 next a
4155 return
```

In the next of the series, I will give you routines to enable your programs to display, amend and print the RECORDs, all inside a browse RECORDS mode. Still to come in the series is possibly the most fascinating aspect of relative filing – sorting, deleting and searching.

Strike Fleet



Strike Fleet puts you on the bridge of the flagship of a taskforce sent to patrol new warzones of the world. At your command you organise frigates, battleships and cruisers armed with the latest missiles and defences as you recreate the battles of the Falklands War, actions in the dangerous waters of the Persian Gulf and the global warfare at the outbreak of World War III.

In all, ten scenarios are included on the double-sided game disk which is crammed into the disk box along with a 55 page instruction manual/know your enemy/and scenario guide that takes you from single ship patrols in the Persian Gulf, through combined ship and helicopter sub hunts in the Falklands to full scale 16 ship battles in the Atlantic.

Once the game has loaded you are presented with a screen through which you can select one of these scenarios, or enter a campaign game that takes you through the last four WWIII scenarios with the survivors of one mission forming the fleet for the next! Since those missions are only for Commanders with steel nerves and lightening reactions we'll go on patrol in the Persian Gulf with the mission of escorting a convoy of tankers out of the Gulf. The next screen, the shipyard, is where you select your forces for the mission by spending points on different classes of ship. For example, a Pegasus missile hydrofoil will cost four points, a quarter of the cost of a Kid Class battleship armed with missiles, torpedoes, defence systems and two helicopters. Once you've chosen the ships of your command it's time to sail into battle.

During the battle or patrol that follows you will use two screens that are loaded in separately from disk which unfortunately, can cause an annoying halt to the action. The first screen you'll meet is the Commander in Chief (CIC) screen which consists of a map of the battle area and menus to issue general orders to the fleet such as destination, speed and alert status. Once these are set you can swap to the bridge of the flagship and have direct control over the navigation and weapons systems.

Anyone who's played EA's Pegasus will immediately recognise the bridge screen with its joystick or keyboard accessed controls to set the ships speed and direction, display the radar and sonar readings and launch missiles, fire deck cannons and activate chaff launchers.

The rest of the task force follow the flagships lead, course and speed but you must command them directly if you want to fire their weapons by swapping to their bridge. This is done by simply pressing the "C" key with repeated presses cycling through your entire fleet. Even though any tankers you may be escorting have no weapons and must be protected by the other parts of your fleet, you must keep a check on the bridge of these vessels as you don't want your heroic efforts to fight off enemy planes, ships and submarines to go to waste because you run aground through poor navigation!

Commanding a task force is a demanding business and to be successful you must know what to expect from your enemy and use your ship's abilities to maximise the defence. If you're expecting any submarines you must keep a regular watch on the sonar screens as a single bleep could mean big trouble.

Anybody, whose played *Silent Service* or *Up Periscope* will know the damage a single sub can do to a convoy. The best defence against submarines is to destroy them before they get too close, and the best way to do this is to send out your helicopters that are equipped with sonar to find the subs and torpedoes to destroy them.

Unfortunately, only one scenario is just a sub hunt and so you have to watch the skies for attacking aircraft, and the seas for enemy ships and even the shore line for landbased missiles. Unless you've got regular helicopter patrols in the right place at the right time, the first you'll know of an attack will be a missile heading towards you!

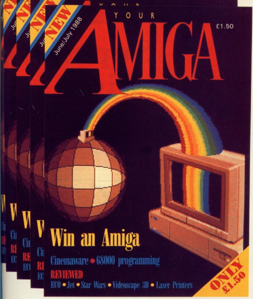
This is the first threat and must be countered with air to air missiles or deflected with chaff launchers. Then you must search out the source of the attack and respond, otherwise you'll be buried in a constant barriage of missiles. As the enemy gets closer your reactions will have to be quicker, to take out all approaching dangers while shooting it out with the enemy gun boats that are now in cannon range. Now, at last you can switch off the computer guidance systems and aim the cannons through a joystick controlled sight and sink the enemy through your own skill which is often more accurate than the ships computers.

As the battle rages your fleet may suffer damage when you will lose crucial weapon systems and even entire ships. Now, only decisive actions will save the day. The way you react in these tight situations will determine whether you'll make a Strike Fleet Commander or end up as a Deck Mopper.

Strike Fleet is an incredibly tense game in which you'll suddenly be thrown into a frantic battle with only a few seconds warning. It's Naval missile combat at its best.

T.H.

Touchline:
Title: *Strike Fleet.* ***Supplier:*** *Electronic Arts, Langley Business Centre, Langley, Nr. Slough, Berks., SL3 8YN.* ***Tel:*** *0753 49442.* ***Machine:*** *C64.* ***Price:*** *£14.95 (Disk only).*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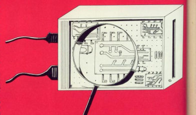
Super Disk Utilities

Stretch your 128 drives to the limit

By Fred Reid



At last! An opportunity to put your 1571 through its paces. Super Disk Utilities (SDU from now on!) is a menu driven package for the 128 (in 80 column mode) and 1571 drive and aimed at the serious disk user. Although if you want to get to grips with the inner workings of your drive, you'll probably find this package invaluable. All the utilities will work with or without a second drive, and some will even work with a 1541! A little experimentation will show how!

Super 81 Utilities is basically the same package with several enhancements for use with the new Commodore 1581 (3 ½") drive. Those of you not familiar with MS-DOS and C/PM disk formats are unlikely to have come across partitioning before. Partitioning enables you to set up reserved areas and sub-directories within a disk – a little like windows. Setting up and controlling these partitions is worthy of a book at least, so Super 81 Utilities will be of immense use here. The Super 81 Utilities come on both 5 ¼" and 3 ½" disks, leaving you with the option of booting the program from either 1571 or 1571 drives. Aside from these, Super 81 utilities is virtually indentical to Super Disk Utilities.

There seems to be little around to compare this package to (apart from Big Blue Reader, reviewed in our April '88 issue), so you'll have to judge it on its own merits. On the surface, things look very slick – an observation affirmed by more intimate examination. The main menu naturally offers selection of the type of operation you wish to perform, namely disk and file copying facilities, CP/M utilities, disk editor, DOS utilities, drive monitor and RAM editor. By selecting one of these options will drop you into the appropriate local menu.

A word on screen layout would seem appropriate here . The top line displays the selected source and destination drive numbers, as well as the menu title so you know where you are, while the next line displays prompts and messages and the bottom line displays drive status and current disk format. The screen centre is used as a general display area, depending on the particular utility in use. Let's look at the various parts.

Disk Copy: a multi-pass disk copier, with a novel feature which allows the transfer of data between 1571 and 1541 disks. It's not a nibbler, so will not copy your protected disks, it will come in handy for preparing backups, etc; essential, prior to using the sector editor.

File Copy: copies individual files (CBM format only) to another disk. Up to 50 files can be copied consecutively, with the buffer holding about 220 sectors at a time. At the outset, the source directory is displayed and the files to be copied are marked.

Both the copy utilities read the source disk fast enough, but it does seem slow when it comes to writing.

CP/M Utilities: probably the most useful part of the package. SDU allows you to examine the format of CP/M and MS-DOS, and format MFM and GCR disks in just about any configuration. Epson, Osborne, IBM and Kaypro formats are all recognised. Also, you can format GCR disks for use with CP/M+ on the 128.

DOS Utilities: all the usual CBM DOS commands (new, scratch, validate, etc) are easily accessed from this section, together with a few 'specials'. The 'Trash a Track' option allows you to create your own copy-protected disks, 'bulk Erase' will wipe a complete disk – this might seem a bit useless, but you can use this option to remove errors that resist normal formatting, rather than throwing the disk!

Disk Editor: be warned – this section is not for the faint-hearted; valuable data can be irrevocably lost at the touch of a key – use the Disk Copy utility to backup first! Having got that out of the way, this is a pretty powerful sector editor for GCR (CBM) format disks. Using the disk editor, you can pull a sector from a disk onto the screen and edit either in Hex or in ASCII before sending the updated sector back to the disk.

I must say I've seen more sophisticated sector editors for the C64/1541 (check the directory editor published in *Commodore Disk User* - Nov/Dec '87), although that doesn't necessarily mean there's anything wrong with this one. The disk editor can be used to edit directory filenames, repair corrupted files, or just customise system messages (this can be great fun).

Drive Monitor: this works the same way as the disk editor, but on the drive's memory. The internal workings of your drive no longer need be a mystery. Every nook and cranny is available for your scrutiny – both RAM and ROM. Memory can be examined and edited (Hex or ASCII) a page at a time, with all the useful information in front of you. Need I say the page is automatically loaded into the 128's RAM, you can use the M/C monitor to disassemble.

'71 Writer: this is complementary to the Drive Monitor section and you can flip between Drive Monitor and '71 Writer without going back through the main menu. 71 Writer lets you assemble code using the 128's M/C monitor and write it to the drive's memory. This is probably not something you'll want to do very often, but if your really want to explore the many hidden features of the 1571, this section is vital.

Having looked at what SDU has to offer, I can begin to describe what it's like to use. I ran into a couple of minor bugs while testing the package and although there's no excuse for bugs in commercial software, they don't interfere with things too much. For example – selecting 'Disassemble' from the 'Drive Monitor' section drops you back to the drive monitor again. You can only disassemble through the 128's M/C monitor, so you need to enter the M/C monitor first.

There are occasions when the drive can't read a disk, but keep trying anyway – the only way out is to power down and reboot. The manual leaves something to be desired, too. Although there's a print option on the Disk Editor, Drive Monitor and '71 Writer don't permit disassembly to printer. However, it's a simple matter to drop into Basic from the M/C monitor and re-enter after typing OPEN4,4 and CMD4:MONITOR.

All disassembly will now be sent to printer, not the screen. As this is such an important operation, I feel this should have been at least mentioned in the manual, if not included in the program! I would also liked to have seen a recommended reading list for those of you who wish to go deeper into disks and drives.

Touchline:
Product: *Super Disk Utilities.* ***Supplier:*** *Free Spirit Software.* ***Distributed by:*** *Financial Systems Software, 2nd Floor, Anbrian House, St. Mary's Street, Worcester.* ***Price:*** *£24.95.* ***Machine:*** *C128 and 1571.*

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Now at an **even lower price,** this superb bundling offer combines the critically acclaimed **Excelerator+** with the super sophisticated **GEOS** (**G**raphic **E**nvironment **O**perating **S**ystem.) **GEOS** brings the power of a graphic interface and integrated disk turbo to the '64/128, from which you can access **geoPAINT**, a full-featured graphic workshop, **geoWRITE**, an easy-to-use WYSIWYG word processor and **Desk Accessories** which include Calculator, Notepad, Alarm clock, Photo album, etc. Many more extensions are available such as spreadsheet **geoCALC**, database/ mail-merge **geoFILE**, etc.

GEOS Products

Full range of GEOS products for the 64 & 128 at the best prices.

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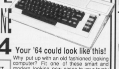
GET THE SLIMLINE '64



Your '64 could look like this!

Only £19.95

Why put up with an old fashioned looking computer? Fit one of these smart and modern looking new cases to your trusty '64, and it will look and feel like you are using a brand new computer. This high quality injection moulded case is simple to fit and gives a lower keyboard height. Don't put up with the old image, order one *now*.

IconTroller Only £11.95

By Suncom, the keyboard mounted cursor controller, a natty little stick that attaches to your Commodore keyboard. Ideal for Icon-driven software, and perfect for GEOS applications.

LC-10 from star

The *NEW* No.1 CBM ready printer

- ■ Four NLQ fonts, yes FOUR
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- ■ Comprehensive 'front panel' operation of most modes
- ■ 96 NLQ print combinations
- ■ 144/36cps print speed
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- ■ Tractor and Friction feeds
- ■ Double & Quad height characters

Representing *quite amazing* value for money comes the LC10 from Star, and now we can offer the all-new colour version offering 7 basic colours to acheive hundreds of blended shades. Both colour and monochrome versions available in Commodore ready form for 64/128 users or as parallel version for Amiga users (multitone colour access available direct from Amiga desktop). Colour version accepts standard LC10 black ribbons. Please state your computer type and either colour or monochrome version when ordering.

Only £199.00

*STOP PRESS....*Colour version now available !

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All prices VAT/delivery inclusive. Next day delivery £5.00 extra.

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Sector Editor

Examine and edit the contents of your Commodore 1541 disks

By Mike Fulton

This program forms a very powerful sector editor for use with the C64 and 1541 disk drive. It's very compact in size, yet has all the commands required of such a utility, combined with ease of use and a clear easy-to-follow display. Although intended for experienced disk users, its simplicity makes it ideal for those who wish to learn more about how the Commodore DOS stores files, and allows simple editing of text files by merely typing over the display.

Summary Of Commands

READ T/S:	Displays requested sector in the current mode.
WRITE T/S:	Writes current sector upon verification.
NEXT T/S:	Displays next sector in current file.
LAST T/S:	Displays previous sector in current file.
HEX/ACSII:	Switches display between alternate modes.
PRINT T/S:	Outputs display to device 4 in current mode.
EDIT T/S:	Allows editing of sector on screen.
ERROR CHN:	Displays current disk status.
TRACE FILE:	Displays remaining sectors in file.
ABORT:	Performs immediate cold start.

Command Details

READ T/S: Selecting this option causes the cursor to appear beneath the track indicator. A two digit input in Hex is expected, however if the current display is correct then a return will input the value shown. Cursor controls may be used to edit but delete is not available. The same chain of events is repeated for the sector number and assuming that the values are legal, the requested sector is displayed on the screen in the current display mode (Hex or ASCII).

Write T/S: This command will display a moving message near the base of the screen, requesting confirmation of the write command. Upon receiving the correct key press the displayed sector is written to the disk. If any other key is depressed then the write routine is terminated and the program awaits a further command.

NEXT T/S: This command causes the next sector in the file to be displayed in the same mode as the current one. If the sector on display is the last in the file, i.e. it has no valid co-ordinates in bytes 1 and 2, then the key press is ignored.

LAST T/S: This command may only be used if a file has been followed with the *NEXT T/S* command, and will only trace back as far as the sector from which the *NEXT T/S* command was initiated. A maximum of 256 previous sectors may be accessed with this command, and it may be alternated with *NEXT T/S* without re-setting the original point.

ASCII/HEX: When this command is selected the display mode is reversed, i.e. if display is in ASCII it is changed to Hex and if in Hex then it changes to ASCII.

PRINT T/S: This command causes the screen display to be output to a printer (device 4). Both display modes are catered for. For clarity, columns are separated by semi-colons.

EDIT T/S: This command allows full editing of the sector on display, in either mode. Display mode may not be changed during edit, delete clear and home are disabled. To exit this mode, press RETURN.

ERROR CHN: This command displays the status of the disk drive. The result is displayed beneath the sector display. Any key will erase the status display and await the next command.

TRACE FILE: When this command is selected, the program requests an input, to determine the output device (screen or printer). This is displayed on the same line as the status display, and expects a response of *P* or *S*. If a valid response is input then the start sector is requested and all remaining sectors in the file are listed. If the display is to the screen then a key press is required to return to the normal display.

ABORT: This key initiates an interrupt driven cold start and is intended for emergency use only.

Getting it all in

Sector Editor is presented as a Basic program. This should be typed in using our *Syntax Checker*, see *LISTINGS* for more details.

The *Sector Editor* program is actually written in machine code, the Basic Loader just being used to POKE the necessary code into memory.

Once POKEd into memory the program resides from $C000 to $CAEE (49152 to 51950). The program is started with a SYS call of 49469 ($C13D). Memory from $CE00 to $CFFF (C52736 to 53247) is also used by the program.

See listing on page 79

DATEL ELECTRONICS

3 SLOT MOTHERBOARD

Save wear and tear on your Expansion Port

- ☐ Accepts 3 cartridges.
- ☐ Switch in/out any slot.
- ☐ Fully buffered.
- ☐ Onboard safety fuse.
- ☐ High grade PCB.
- ☐ Reset button.

ONLY £16.99

DATA RECORDER

- ☐ Quality Commodore compatible data recorder.
- ☐ Pause control.
- ☐ Counter.
- ☐ Suitable for 64/128.
- ☐ Send now for quick delivery.

ONLY £24.99

SMART CART ™

Now you can have an 8K or 32K cartridge that you program like RAM then acts like ROM!

- ☐ 8K or 32K pseudo ROM.
- ☐ Battery backed to last up to 5 years (lithium battery).
- ☐ Simply load the program you require – then flick the switch. The cartridge can then be removed just like a ROM cartridge.
- ☐ Make your own cartridges including autostart types – without an EPROM burner.
- ☐ Can be switched on or off board via software.
- ☐ I/O 2 slot open for special programming techniques.
- ☐ 32K version has 4 x 8K pages.
- ☐ Some knowledge of M/C is helpful – but full instruction are provided.

8K VERSION £14.99
32K VERSION £29.99

SMARTCART UTILITIES

A series of utility programs for use with Smartcart. Simply load in the program and you have a powerful cartridge. When you have a different requirement – load in another program and you have a new cartridge. The process takes seconds, and can be repeated any number of times.

We intend to release a range of programs. The first available are:

DISKMATE II

☐ all the features of Diskmate II (see ad).

Loaded in seconds – with full instructions. **ONLY £9.99**

PRINTER IV

Now you can turn your MPS 801 into 4 printers in one!!

- ☐ Alternative character set ROM – fitted in seconds.
- ☐ All four sets have true descenders.
- ☐ 100% compatible with all software.
- ☐ Descender. ☐ Eclipse.
- ☐ Scribe. ☐ Future.
- ☐ Choose any set at the flick of a switch.

"For anyone who uses their printer often this chip is a must. It's quick and easy to use and the end results are impressive" – Your Commodore, Jan 87.

ONLY £19.99

TURBO ROM II

Turbo Rom II is a replacement for the actual kernal inside your 64. It provides superfast load/save routines.

- ☐ Loads most programs at 5-6 times normal speed.
- ☐ Saves at 5-6 times normal.
- ☐ Improved DOS support including 10 sec format.
- ☐ Programmed function keys:- load, directory, old, etc.
- ☐ Return to normal kernal at flick of a switch.
- ☐ FCOPY – 250 block file copier.
- ☐ FLOAD – special I/O loader.
- ☐ Plus lots more.
- ☐ Fitted in minutes – no soldering usually required. (On some 64's the old ROM may have to be desoldered).

ONLY £14.99

DIGITAL SOUND SAMPLER

- ☐ The new sampler allows you to record any sound digitally into memory and then replay it with astounding effects.
- ☐ Playback forwards/backwards with echo/reverb/ring modulation etc.
- ☐ Now with full sound editing module to produce outstanding effects.
- ☐ Full 8 bit D to A and ADC conversion.
- ☐ MIDI compatible with suitable interface. (I.e. Datel unit for £29.99, see ad).
- ☐ Live effects menu includes real time display of waveforms.
- ☐ Line in/mic in/line out/feedback controls.
- ☐ Powerful sequencer with editing features.
- ☐ Load/save sample.
- ☐ Up to 8 samples in memory at one time.
- ☐ Tape or disk (please state).
- ☐ Complete software/hardware package **£49.99**

☐ Com-Drum software is available separately at **£9.99** to turn your Sampler II into a Com-Drum system as well as a sampling system,

BLAZING PADDLES

A complete lightpen/graphics illustrator package.

- ☐ A fully icon/menu driven graphics package of a calibre which should cost much more.
- ☐ Complete with a fibre optical lightpen system for pin point accuracy.
- ☐ Multi feature software including:
  - ● Range of brushes ● Airbrush ● Rectangle ● Circle ● Rubberbanding ● Lines ● Freehand
  - ● Zoom mode ● Printer dump ● Load/save ● Advanced colour mixing – over 200 hues!!
  - ● Cut and paste allows shapes/windows/pictures to be saved to/from tape/disk.
- ☐ Blazing Paddles will also work with many other input devices including: Joysticks, Mice, Graphics Tablets, Trackball etc.
- ☐ Pictures can be saved from Action Replay and edited with Blazing Paddles.

Complete Blazing Paddles & Lightpen **ONLY £24.99**

Blazing Paddles available separately for **£12.99**

TOOLKIT IV

The ultimate disk toolkit for the 1540/1541

- ☐ A disk toolkit is an absolute must for the serious disk hacker. Toolkit IV has more features than most for less.
- ☐ DISK DOCTOR V2 – Read and write any track and sector including extra and renumbered tracks. Repair damaged sectors. Look underneath read errors.
- ☐ HEADER/GAP EDITOR – Decodes and displays ALL header information including off bytes and header gap. Rewrite the entire header and header gap. Renumber sectors. Also edit any sector tail gap.
- ☐ DISK LOOK – Sort directory. Recover lost files. Display file start/end addresses. Disassemble any file program directly from the disk to SCREEN or PRINTER including undocumented opcodes. Edit Bam. Much, much more.
- ☐ FILE COMPACTOR – Can compact machine programs by up to 50%. Saves disk space. Compacted programs run as normal.
- ☐ FAST DISK COPY – Copy an entire disk in 2 minutes or less using single 1541.
- ☐ FAST FILE COPY – Selective file copy. Works at up to 6 times normal speed.
- ☐ FORMATTER – 10 second format an entire disk or format any individual track or half track 0 to 41. Redefine any of 30 parameters to create or recreate unique disk formats.
- ☐ ERROR EDIT – Quickly find and recreate all read errors including extra and renumbered tracks or sectors and half tracks from 0 to 41. Even recreates data under errors and allows you to redefine any necessary parameters.

ONLY £9.99

RAM DISK

- ☐ Turn your Smart Cart into a 32K RAM/disk.
- ☐ 32K of instant storage area for files/programs.
- ☐ Load/save instantly.
- ☐ Disk type commands: load, save, directory, scratch.
- ☐ Program data retained when computer is switched off!
- ☐ Full command set with instructions.

ONLY £9.99

COM-DRUM

Digital Drum System

- ☐ Now you can turn your computer into a digital drum system. ☐ Hardware/software package.
- ☐ 8 digital drum sounds in memory at one time.
- ☐ Complete with 3 drum kits.
- ☐ Real drum sounds – not synthesised.
- ☐ Create superb drum rhythms with real and step time. ☐ Full editing. ☐ Menu driven.
- ☐ Output to hi-fi or through tv speaker.
- ☐ Load/save facilities.

ONLY £29.99 (state tape or disk)

COM-DRUM EDITOR

- ☐ 24 drum sounds supplied on disk to enable you to construct your own drum kit.
- ☐ Re-arrange sounds supplied with a Com-Drum to make new kits.
- ☐ With sound sampler hardware you can record your own kits. ☐ Load/save facilities.

ONLY £4.99 disk only

ROBOTEK 64

Model & Robot Control made easy

- ☐ Robotek 64 is a comprehensive hardware/software package which enables you to connect your 64/128 to the outside world.
- ☐ 4 output channels – each with onboard relay
- ☐ 4 input channels – each fully buffered TTL level sensing.
- ☐ Analogue input with full 8 bit conversion.
- ☐ Voice input for voice control.
- ☐ Software features:- test mode/analogue measurement/voice activate/digital readout etc.
- ☐ Excellent value! **ONLY £39.99**

including hardware/software/mic etc. (State tape or disk)

DATEL ELECTRONICS

256K SUPEROM EXPANDER

- ☐ Now you can select from any of 8 32K EPROMs instantly.
- ☐ 8 sockets to accept upto a 32K EPROM in each.
- ☐ On board operating system — no programs to load.
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- ☐ Fully menu driven on power up.
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- ☐ This board fits in place of the kernal in your 64 and accepts a 16K or 32K replacement kernal giving 2 or 4 different operating systems.
- ☐ Just flick the switch supplied to select between systems.
- ☐ This is a carrier only — ready to accept your own chip.
- ☐ Now you can have all your different systems available at one time.

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- ☐ Requires access to two CBM type data recorders.
- ☐ Makes perfect copies.
- ☐ Very simple to use.
- ☐ LED level indicator.

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- ☐ Unstoppable reset button.
- ☐ Resets even so called "unstoppable" programs.
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- ☐ Fits in cartridge port.
- ☐ Simply plug in.

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DUPLIKATOR™

- ☐ Copies whole disk in one pass – only one drive required!
- ☐ Makes backup copies in eight seconds!!
- ☐ Duplikator is the fastest, most efficient and easiest to use disk copying system ever conceived.
- ☐ Comes complete with 256K on-board ram and it's own operating system – no software to load.
- ☐ Makes multiple copies from one original.
- ☐ Full disk verification during backup process.
- ☐ Copies standard software as well as errors 21-29 and upto 40 tracks.
- ☐ Full disk error check in eight seconds.
- ☐ Full disk verify against ram in fifteen seconds.
- ☐ A must for clubs, user groups etc. How else can you copy over 250 disks and hour for less than £100.
- ☐ Comes complete with on/off switch and reset button.
- ☐ Fitted in minutes – no soldering usually required.

ONLY £89.99

DEEP SCAN BURST NIBBLER™

- ☐ The most powerful disk nibbler available anywhere, at any price!
- ☐ Burst Nibbler is actually a two part system — a software package **and** a parallel cable to connect the 1541/1570/1571 to 64/128 (state type).
- ☐ What gives Burst Nibbler its power? Conventional nibblers have to decode the data from the disk before it can transfer it using the serial bus — when non standard data is encountered they are beat. Burst Nibbler transfers data as raw GCR code via the parallel cable without the need to decode it so you get a perfect copy of the original.

- ● Will nibble upto 41 tracks. ● Copy a whole disk in under 2 minutes. ● Full instructions.
- ● Regular updates — we always ship the latest. ● Fitted in minutes — no soldering usually required.
- ● Full or ½ tracks. ● No need to buy parallel cable if you have Disk Demon/Dolphin etc.
- ● Cable has throughbus extension for other add ons.

- ☐ Whether to choose FastHack'em or Burst Nibbler? Fast Hack'Em is unbeatable value as an "all-rounder" — with nibblers, 1 or 2 drive copy, format, file copy, 1571 copy etc. etc., so if you have a more general requirement perhaps FastHack'Em is for you. Burst Nibbler is a pure nibbler second to none, for the reasons stated. So if it's just making backups you are interested in, there is no other product to beat it.

ONLY £24.99 COMPLETE

SOFTWARE ONLY £12.99 CABLE ONLY £14.99

EPROMMER 64™

- ☐ A top quality, easy-to-use EPROM programmer for the 64/128.
- ☐ Fully menu driven software/hardware package makes programming/reading/verifying/copying EPROMs simplicity itself.
- ☐ Will program 2716, 2732, 2764, 27128 and 27256 chips. 12.5, 21 or 25 volts.
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- ☐ Full feature system — all functions covered including device check/verify.
- ☐ We believe Eprommer 64 is the most comprehensive, most friendly and best value for money programmer available for the 64/128.
- ☐ Ideal companion for Superom Board, Cartridge Development System, our kernal expanders or indeed any EPROM base project.
- ☐ Comes complete with instructions — plus the cartridge handbook.

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16K EPROM BOARD

- ☐ Accepts 2 x 8K EPROMs.
- ☐ Switchable to configure as 2 x 8K or 16K or off.
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- ☐ Full instructions.

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DISK NOTCHER

- ☐ Quickly and easily double your disk capacity.
- ☐ Use both sides of your disks.
- ☐ Simple to use.
- ☐ Takes seconds.

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DATEL ELECTRONICS

PROFESSIONAL DOS ™ MIKROTRONIC

£64.99 POST FREE with Disc Demon operating system

"The world's fastest parallel operating system"

- ❑ Loads a typical 202 block program file in under 3 seconds!
- ❑ 60x faster load (PRG files).
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- ❑ 20x faster save (PRG files).
- ❑ 20x faster save (SEQ files).

PLUS AN ADVANCED COMMAND STRUCTURE INCLUDING:

- ❑ Fast format – up to 40 tracks (749 blocks).
- ❑ 16 function keys: list, run, load, directory, format, save, old, verify, etc.
- ❑ Read will fastload files up to 250 blocks (other similar systems will only cope with 202 blocks).
- ❑ Number conversion. ❑ Reset.
- ❑ Unique built in file copier will copy files up to 250 blocks like lightning – multiple copy options – perfect for copying Action Replay files.
- ❑ Highly compatible with commercial software – can be switched out for non compatible programs.
- ❑ Perfect for use with Action Replay 3 – a typical AR3 backup will reload in about 3 seconds – yes 3 seconds!
- ❑ Speeds up other DOS functions including verify, scratch etc.
- ❑ Comes complete with superfast file and whole disk copier free!
- ❑ Screen on or off during loading.
- ❑ Enhanced command set – over 30 new commands.
- ❑ Easily fitted – Disk Demon plugs inside the 1541 and the new operating system chip plugs inside the C64/128. Fitting takes only minutes and usually requires no soldering.
- ❑ User port throughbus supplied free – you could pay $15.00 for this alone.
- ❑ Supplied complete – no more to buy.
- ❑ Works on C128/1541 in 64 or 128 mode.

C128 version

£69.99

BLUE CHIP DRIVE

● **Fully C64/128 compatible.**

- ❑ At last a top quality drive at a sensible price.
- ❑ Super slimline case
- ❑ External power supply for cool operation.
- ❑ Direct drive motor
- ❑ Supplied complete with all cables – no more to buy.
- ❑ This drive is now probably the most compatible drive available for the Commodore. More so than even Commodores own '1541C. Much more so than other so called compatibles. In fact we have been unable to find a program including the latest that would not work. (At time of Press).
- ❑ **No need to look elsewhere – this is the best.**

ONLY £139.99 POST FREE

(If you require courier delivery add £5.00).

ULTRA CRUNCHER

● **The ultimate cartridge based program compactor.**

- ❑ Compacts by upto 30%!
- ❑ More programs for disk.
- ❑ 3 compacting programs on one cartridge.
- ❑ Fast loading/saving routines – works with Disc Demon.
- ❑ Can even further compact AR III files!
- ❑ 250 block file copy function.
- ❑ Full DOS support including fast format.

ONLY £12.99 on cartridge. Avilable as chip only for 256K Superom Board for only £7.99

FAST HACK'EM ™

● **Multi Module Disk Nibbler – all on one disk.**

- ❑ Single 1541 Nibbler – Copy a disk in 2 minutes.
- ❑ Auto Nibbler – Copy an entire protected disk in 3 minutes.
- ❑ Super fast File Copy – Under 9 seconds typically.
- ❑ Copes with Fat Tracks.
- ❑ Superfast Copy – Entire disk in 36 seconds with verify.
- ❑ Twin Drive Copier – Even faster!
- ❑ Plus unique "Parameters" mode. These files "Unlock" the more heavily protected programs with a parameter for a particular brand or even single program.
- ❑ **No other product is such a good "All Rounder" at this price its unbeatable.**

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DISKMATE II

The Disk Utility Cartridge

- ❑ Disk fastload cartridge.
- ❑ Up to 8 times faster.
- ❑ Fast save. ❑ Fast format (10 secs).
- ❑ Improved DOS – single stroke commands – load/save/dir/old etc.
- ❑ Redefined function keys for fast operation of common commands.
- ❑ Powerful toolkit commands including: old/delete/merge/copy/append/autonum/linesave etc.
- ❑ Plus a full machine code monitor – too many features to list but it has them all!
- ❑ Special switching techniques make Diskmate invisible to the system. Therefore it is a more compatible fastloader than other types.
- ❑ Diskmate II is

ONLY £14.99

MIDI 64

A Full Midi Interface for the 64/128 at a realistic price

- ❑ MIDI in. ❑ MIDI thru. ❑ 2 x MIDI out.
- ❑ Compatible with most leading software packages including: Seil, JMS, Advanced Music System, Joreth, Steinburg etc.

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MOUSE

- ❑ CBM 64/128 mouse.
- ❑ Wide compatibility with software including: Blazing Paddles.
- ❑ Works by mimicking joystick so will work in any joystick application including graphic packages only designed for joystick.
- ❑ Functions on either joystick port.
- ❑ Optical system operation.

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CHIPS

- ❑ 27128 **£3.00 EACH**
- ❑ 27256 **£4.50 EACH**

CARTRIDGE DEVELOPMENT SYSTEM

- ❑ All the necessary parts to produce an 8K/16K auto-start cartridge.
- ❑ Top quality PCB. ❑ Injection moulded case.
- ❑ Reset switch. ❑ 16K EPROM.
- ❑ "Cartridge Handbook" gives full details and tips on building and configuring the cartridge for many uses.

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complete with handbook

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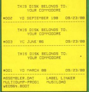
CatSort

Do you have hundreds of disks and can never find the program that you want? Then this program may be for you

By Stuart Cooke



```
#001   YD MARCH 88            09/23/88
--------------------------------------

       THIS DISK BELONGS TO:
          YOUR COMMODORE

#002   YD SEPTEMBER 198    09/23/88
--------------------------------------

       THIS DISK BELONGS TO:
          YOUR COMMODORE

#003   YC JUNE'86             09/23/88
--------------------------------------

       THIS DISK BELONGS TO:
          YOUR COMMODORE


#001   YD MARCH 88            09/23/88
--------------------------------------
ASSEMBLER.DAT       LABEL LINKER
MULTIDUMP-PROG1     MUSILOAD
WEOS64.BOOT
```

If there is one thing that really infuriates me it's people who have an immaculate disk collection. You know the type I mean, all disks colour-coded and, a neat list of all programs contained on the disk written neatly on the label! Should you ask them for a program they can go straight to the correct disk, even though they may have more than 200 disks in their collection – sickening eh?

Now, don't get me wrong, it's not that I dislike the type of person that can be so organised, it's just that I'd love to be able to get my disk collection into a similar state, but even after months of trying my disk collection still consists of disks with no labels, disks with incorrect labels, disks with labels but nothing on them. Finding a specific program is a work of art never mind the amount of time it takes to go through the 20 or so 'I know it's on a disk with no label' floppies.

Or rather that was the case until I got my hands on SuperCat, a disk catalogue system.

There have been many disk catalogue programs in the past, we have even published some in this magazine. Personally, I've quite often found that they did not do everything that I required or were a little difficult to use. If you are in the same boat then SuperCat is the program that you have been waiting for.

Getting Started

To use SuperCat to its full capability you need the program disk plus two blank ones. One of these becomes the Master Directory Disk (MDD from now on), where information on each disk is stored. The second disk becomes the CatSort disk, where an alphabetic list of all the programs is stored. Up to 640 disks or 5000 titles can be stored, this should be enough for just about everyone's disk collection.

When you first start SuperCat there are four main sections, which I will deal with in further detail later on. These are:

- Master Directory Builder
- Utilities
- Catalog Sort
- Print Routines

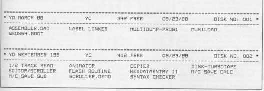
One other point worth mentioning before I expand on the above is that the program makes extensive use of dates. Each time you start the program you must enter the date, this date is written to your MDD so that you have a permanent record of when you last used the program as well as being able to keep all of your disks in date order on the master directory disk.

Master Directory Builder

This is the section of the program that allows you to input disks. Before you can do this for the first time you must set a number of defaults so that the SuperCat program knows a bit about the computer set-up that you are using.

Options exist for using one 1541 drive, two 1541 drives or a dual disk system. If you have more than one disk drive the amount of disk swapping that you have to perform is much less.

Each disk in the master directory is given a number by which it is referred. In the set-up options you have the option of writing this number to each disk that you catalog. This allows SuperCat to realise that a disk has already been cataloged stopping you from cataloging a disk more than once. There is only one problem if you select this option – some commercial disks use protection systems so that the program will no longer work if you write the disk number onto that disk. My answer to this problem was to set up two disk catalogs – one for my own unprotected disks, the other for



```
SUPERCAT MASTER DIRECTORY              SEQUENTIAL DISK LISTING              09/23/88

----------------------------------------------------------------------------------
* YD MARCH 88          YC          342 FREE     09/23/88         DISK NO: 001 *
----------------------------------------------------------------------------------
  ASSEMBLER.DAT        LABEL LINKER        MULTIDUMP-PROG1    MUSILOAD
  WEOS64.BOOT

----------------------------------------------------------------------------------
* YD SEPTEMBER 198     YC          412 FREE     09/23/88         DISK NO: 002 *
----------------------------------------------------------------------------------
  1/2 TRACK READ       ANIMATOR            COPIER             DISK-TURBOTAPE
  EDITOR/SCROLLER      FLASH ROUTINE       HEXDATAENTRY II    M/C SAVE CALC
  M/C SAVE SUB         SCROLLER.DEMO       SYNTAX CHECKER
```

my commercial software.

The last option in set-up is telling the program what sort of printer you are using. Only printers that use the normal Commodore serial port are supported.

Once you have the defaults set up getting information about your disks into the catalog is a breeze. Simply place the disk in the drive and wait for the directory to load once prompted. As soon as the directory is finished the disk contents will be displayed on screen, the format of the display being reminiscent of a few file copiers. It's up to you to select exactly which titles you place on the MDD, after all if you have a program called Disk Editor and it has two more sections called 'Part 1' and 'Part 2' you only want to put the actual program title onto the MDD.

Various options are available at this stage including the ability to change the name of the disk in the drive, you can write the new name to the disk. You can change the name of a file but this is only changed within SuperCat, it is not written to the original disk.

Once you have a number of disks entered on the MDD you can start to use the real power of SuperCat. Within the directory builder you have the option to list on the screen the contents of any disk simply by entering the disk number, this number is either assigned by you when you save the disk contents to the MDD or let the computer choose a free number for you. The only problem that you now have is remembering which disk has which disk number, SuperCat will make this easy through its various print options.

Utility Functions

Selecting this option gives you facilities for updating the master directory. This is the same as entering a disk to the master directory mentioned above, however, the information comes from the MDD not from the original disk. Once you have the selected disk on screen you can change the name of files, delete them and even enter new files by hand, the quickest way of keeping your disk library up to date.

This section of the program also gives you the ability to search the CatSort Disk. As already mentioned this is a disk, created from one of the menu options, that contains an alphabetical list of all files on the MDD.

To search this disk simply enter a search string when prompted and wait for a list of the disks containing that program to appear. You can even enter wild cards. For example entering DISK* as the search string will cause a list of all the disks containing a program that starts with the name DISK to appear on the screen. Note, only the disk number and matching filename appears on screen, not the list of all the files on each disk.

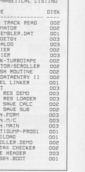
Catalog Sort

This is where you create the CatSort disk. Each time that you have updated the MDD this disk needs to be recreated from scratch so that the file contents are up to date.

Creating this disk can take some time as well as a large amount of disk swapping, unless you have more than one drive. You may therefore want to recreate this disk only when you have entered a significant number of new disks into the master directory.

Printing Reports

There are numerous options for printing out reports. Should you have a 'basic' printer that doesn't support



```
SUPERCAT MASTER DIRECTORY
  ALPHABETICAL LISTING

  NAME                  DISK
  ---------------       ----
  1/2 TRACK READ         002
  ANIMATOR               002
  ASSEMBLER.DAT          001
  BUDGET64               003
  CATALOG                003
  COPIER                 002
  COPIER                 003
  DISK-TURBOTAPE         002
  EDITOR/SCROLLER        002
  FLASH ROUTINE          002
  HEXDATAENTRY II        002
  LABEL LINKER           001
  LIST                   003
  LOW RES DEMO           003
  LOW RES LOADER         003
  M/C SAVE CALC          002
  M/C SAVE SUB           002
  MF64.FORM              003
  MF64.M/C               003
  MF64.MAIN              003
  MULTIDUMP-PROG1        001
  MUSILOAD               001
  SCROLLER.DEMO          002
  SYNTAX CHECKER         002
  TAPE HEADER            003
  WEOS64.BOOT            001
```

subscripts, etc., you will probably only use the print options within the program. If however, you have a printer that is capable of special print functions such as an Epson or a Star then you will be able to use separate print programs outside SuperCat to enable you to get more information on each printed page or label. It is important to note that if you do want to use the external print files then you will have to alter the listing programs yourself so that they suit your printer. The programs are well documented and anyone armed with a small knowledge of Basic and their printer manual should have no problems.

The difference between using the internal print options and the external onces become apparent when you realise that you can get a list of 375 titles per page using the condensed print of the external files rather than just 165 for the standard print version. All of the print options should be self-explanatory.

Some examples of printouts are included with this article so that you can see what is possible. The print options are as follows:

- Print list of disks in numerical order.
- Print disk numbers not used.
- Print disks in date order.
- Print alphabetical program names.
- Print disk headers in numerical order.
- Print a lable with message 'this disk belongs to...'
- Print one label with six program titles on it.
- Print as many labels for a disk as required to print all titles.

If you use the external print files then you can get up to 30 program titles on each disk label; the option that I have used to print labels for all of my disks. I only found a couple of disks that I had more than 30 titles for.

All labels have details about the disk name, ID, date it was cataloged and the disk number.

Final Thoughts

Since starting to use SuperCat my relationship with my disk drive has changed dramatically. No longer do I overwork it trying to find a disk that contains a program that I'm sure was called 'XXZYZ'. Now all I have to do is look at my alphabetic listing of file names and go straight to the disk I want.

The disk is easy to find as it has a neat label on it with the disk number and the names of the files on it.

Some people may be put off using a system such as SuperCat because of the amount of time taken to set it up to start with. Don't be, it only took me a single Saturday afternoon of on and off disk cataloging to input all of my 300+ disks and it certainly was worth it.

In my opinion all Commodore disk drives should go on strike until their owners buy them a copy of this program!

Touchline:

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The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

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What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:

📼

This symbol means that the program is available on cassette.

💾

These programs are available on disk.

Please Note

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First Steps

Take some good advice and you'll dispell those bugged listing blues forever

By Norman Doyle

LISTINGS INFO CENTRE

"None of your listings ever work!" This is typical of the subtle approach of some of the readers who ring us up. Then there follows a lengthy tirade of abuse but eventually I stop and listen! Normally the fault isn't one of ours but results from a lack of understanding of debugging techniques. To help here are some of the common complaints and their solutions.

"How can I type in all of the parts of this program? The line numbers are the same and just overwrite one another."

There are many reasons why a program can have several parts to it. For example, there might be a Basic master program which calls on a machine code subroutine and has user-defined graphics. It could have been writen as one program but the problem is that once the code and graphics have been poked into memory these substantial parts of the program are then redundant and can slow down the execution of the actual master program. The solution is to use three programs. The first pokes the graphics in place, the second positions the code and the third is the real program.

The first two programs look almost identical because they are just reams of data statements with a few short lines of 'real' program. Typically, both programs will start at line 10 and these first few lines will form a loop with a pole command which pushes the data into consecutive memory locations.

You then repeat the procedure for program two and then, after saving and newing, program three is typed in and saved. If using a cassette as the save device, the three programs should follow one another in the correct order on the tape.

Assuming that everything has been typed in correctly, the program is ready to run. This means that the first program is loaded and run. Often code is stored at 49152 so the program will fill this area with numbers which form the machine code part of the program. Once the program finishes you can safely use NEW to get rid of the program without losing the code. Why? Well, the NEW command only changes a few bytes of memory and the rest of memory stays as it was. Although you can no longer list the original program, the changes it has made in memory will still be there.

Similarly, after loading and running the second program the values poked into memory will stay ready for the third program to access when it is loaded and run. The only way that the system can be defeated is by switching the machine off between loads.

"The program looks alright when I check it with the listing but it still produces errors."

First re-read the instructions to make sure that there isn't something that you've forgotten to do. If that checks out OK there are several other areas where errors can creep in. Parts of the program within quotes (i.e. print and input statements) can be ignored as well as the contents of REM statements but variables and commands bear closer scrutiny.

If the error is syntactical make sure that you've used the correct spelling, ensure that commas, fullstops, semi-colons and colons are used correctly. If this all measures up make sure that all of the zeros are actually the number zero and not the letter 'O' and vice versa. The same applies to the number one and letter 'l'.

Sometimes a program line exactly fills one screen line. If this is the case there should be a full blank line left when RETURN is pressed. If this is not adhered to, the next line entered will be concatenated (joined on) to the current line and a syntax error generated when the program runs. When listing the program, the line looks quite acceptable but looks can be deceptive so keep an eye open for this error.

Data lines are by far the most likely area for mistakes. It's a long and tedious job to type in rows of figures, and errors often occur which are difficult to find. It is difficult to see if a fullstop has been used instead of a comma but the computer reads the value as a decimal and the data becomes one item short. The only solution is to exercise the utmost care when typing in the data. To check for errors, write a short program which will read and print the data on the screen. Substituting a suitable value for x in the following short program should do the trick:

```
FOR A=0 TO x :READ Y:PRINT
Y:NEXT:END
```

For data which involves text change Y to Y$.

The main rule is to maintain concentration by doing a few lines, resting and then tackling a few more rather than slogging through to the early hours. Always suspect your own work because the listings are created from working copies of the program (occasionally errors do creep in but not very often). I strongly advise that C64 owners use the Syntax Checker and that everyone reads the Listings advice page carefully. Diligence will reap its own rewards with immediate success – concentrate, persevere and you'll get there in the end.

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Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]

This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

```
PROGRAM: SYNTAX CHECKER

 5 REM SYTAX CHECKER - ERIC DOYLE

 10 BL=10   :LN=70   :SA=49152
 20 FOR L=0 TO BL:CX=0:FOR D=0 TO
  15
 30 READ A:IF A>255THENPRINT"NUMB
 ER TO LARGE";LN+(L*10):STOP
 40 CX=CX+A:POKE SA+L*16+D,A:NEXT
  D
 50 READ A:IF A><CX THENPRINT"ERR
 OR IN LINE";LN+(L*10):STOP
 60 NEXT L:SYS 49152:NEW
 70 DATA 173,5,3,201,165,208,31,1
 20,169,9,141,32,208,141,33,208,1
 847
 80 DATA 169,7,141,134,2,169,13,3
 2,210,255,169,64,141,4,3,169,168
 2
 90 DATA 192,141,5,3,88,96,120,16
 9,124,141,4,3,169,165,141,5,1566

 100 DATA 3,169,14,141,134,2,141,
 32,208,169,6,141,33,208,88,96,15
 85
 110 DATA 32,124,165,72,138,72,15
 2,72,162,0,165,20,133,254,165,21
 ,1747
 120 DATA 24,101,254,133,254,189,
 0,2,240,18,69,254,133,254,232,18
 9,2346
 130 DATA 0,2,240,8,24,101,254,13
 3,254,232,208,233,169,1,141,134,
 2134
 140 DATA 2,165,254,74,74,74,74,3
 2,156,192,32,210,255,165,254,41,
 2054
 150 DATA 15,32,156,192,32,210,25
 5,169,13,32,210,255,169,13,32,21
 0,1995
 160 DATA 255,169,7,141,134,2,104
 ,168,104,170,104,96,24,105,48,20
 1,1832
 170 DATA 58,16,1,96,24,105,7,96,
 0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one another out are very small. Many of the listings are presented in lower case. To turn your computer to lower case mode press the Commodore key and the SHIFT key at the same time.

Mnemonic	Symbol	Keypress
[RIGHT]	]	CRSR left/right
[LEFT]	▍	SHIFT & CRSR left/right
[DOWN]	Q	CRSR up/down
[UP]	●	SHIFT & CRSR up/down
[F1]	▔	f1 key
[F2]	╲	SHIFT & f1 key
[F3]	▁	f3 key
[F4]	╮	SHIFT & f3 key
[F5]	▎	f5 key
[F6]	╯	SHIFT & f5 key
[F7]	▕	f7 key
[F8]	L	SHIFT & f7 key
[HOME]	S	CLR/HOME
[CLR]	♥	SHIFT & CLR/HOME
[RVSON]	R	CTRL & 9
[RVSOFF]	▂	CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]	┐	CTRL & 1
[WHITE]	E	CTRL & 2
[RED]	£	CTRL & 3
[CYAN]	◥	CTRL & 4
[PURPLE]	▚	CTRL & 5
[GREEN]	⬆	CTRL & 6
[BLUE]	⬅	CTRL & 7
[YELLOW]	π	CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

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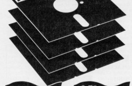

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Listings

BYTING INTO THE 6510

```
PRG-NAME: BYT'TYPEWRITER
FILENAME: TAPE LOAD

10              ORG 50400
20    ;
30    SCREENMEM EQU 251
40    SCREENCOL EQU 253
50    TEXTFILE  EQU 166
60    TEXTFILE1 EQU 168
70    ;
80    GETIN     EQU $FFE4
90    SETNAM    EQU $FFBD
100   SETLFS    EQU $FFBA
110   LOAD      EQU $FFD5
120   ;
130   ;OPEN CHANNELS FOR TAPE INPUT.
140   ;
150             LDA FILENAME
160             LDX #<FILENAME+1
170             LDY #>FILENAME+1
180             JSR SETNAM
190   ;
200             LDA #1
210             LDX #1
220             LDY #1
230             JSR SETLFS
240   ;
250   ;SIGNIFY "LOAD" IN A AND SET
260   ;BEGINNING OF LOAD IN X AND Y.
270   ;
280             LDA #0
290             LDX #<10000
300             LDY #>10000
310   ;
320   ;LOAD TEXTFILE FROM TAPE.
330   ;
340             JSR LOAD
350 . ;
360   ;IF ERROR, EXIT STRAIGHT AWAY.
```

```
370   ;
380             BCS EXIT
390   ;
400   ;REPRINT TEXTFILE ON SCREEN:
410   ;INITIATE TEXTFILE.
420   ;
430             LDA #<10000
440             STA <TEXTFILE
450             LDA #>10000
460             STA >TEXTFILE
470   ;
480             STX <TEXTFILE1
490             STY >TEXTFILE1
500   ;
510   ;INITIATE SCREEN AND COLOUR VARS.
520   ;
530             LDA #<1024
540             STA <SCREENMEM
550             LDA #>1024
560             STA >SCREENMEM
570   ;
580             LDA #<55296
590             STA <SCREENCOL
600             LDA #>55296
610             STA >SCREENCOL
620   ;
630   ;CLEAR THE SCREEN.
640   ;
650             JSR $E544
660   ;
670   ;SWITCH COMPUTER INTO
680   ;BUSINESS MODE.
690   ;
700             LDA #14
710             JSR $E716
720   ;
730   ;GET CHARACTER FROM TEXTFILE.
740   ;
750             LDY #0
760   PRINTLOOP LDA (TEXTFILE),Y
770   ;
780   ;CONVERT ASCII INTO SCREEN CODE.
790   ;
800             CMP #128
810             BCC SKIP
820             SBC #64      ;UPPER CASE
830   SKIP      CMP #64      ;LOWER CASE
840             BCC PRINT
850             SBC #64
860   ;
870   ;PRINT CHARACTER ONTO SCREEN.
880   ;
890   PRINT     STA (SCREENMEM),Y
900             LDA #6
910             STA (SCREENCOL),Y
920   ;
930   ;ADVANCE TO NEXT PRINT POSITION.
940   ;
950             INC <TEXTFILE
960             BNE NOHIGH1
970             INC >TEXTFILE
980   ;
990   NOHIGH1   INC <SCREENMEM
1000            BNE NOHIGH2
1010            INC >SCREENMEM
1020  ;
1030  NOHIGH2   INC <SCREENCOL
1040            BNE NOHIGH3
1050            INC >SCREENCOL
1060  ;
1070  NOHIGH3   LDA <TEXTFILE
1080            CMP <TEXTFILE1
1090            BNE PRINTLOOP
1100            LDA >TEXTFILE
1110            CMP >TEXTFILE1
1120            BNE PRINTLOOP
1130  ;
1140  ;FINISHED: WAIT FOR KEYPRESS...
1150  ;
1160  WAITKEY   JSR GETIN
1170            BEQ WAITKEY
1180            CMP #32
1190            BEQ WAITKEY
1200  ;
1210  ;AND EXIT BACK TO BASIC.
1220  ;
1230  EXIT      RTS
1240  ;
1250  ;
1260  ;
1270  FILENAME  BYT 8,"TEXTFILE"
```

```
PRG-NAME: BYT'TYPEWRITER
FILENAME: PRINTER ROUT.
```

```
10                ORG 50600
30     ;
40     TEXTFILE   EQU 166
50     ;
60     SETNAM     EQU $FFBD
70     SETLFS     EQU $FFBA
80     OPEN       EQU $FFC0
90     CHKOUT     EQU $FFC9
100    CR         EQU $AAD7
110    PRINT      EQU $AB47
120    CLOSE      EQU $FFC3
130    CLRCH      EQU $FFCC
140    ;
150    ;OPEN OUTPUT CHANNELS TO PRINTER.
160    ;
170               LDA #0
180               JSR SETNAM
190    ;
200               LDA #4
210               TAX
220               LDY #255
230               JSR SETLFS
240    ;
250               JSR OPEN
260    ;
270               LDX #4
280               JSR CHKOUT
290    ;
300    ;INITIATE TEXTFILE.
310    ;
320               LDA #<10000
330               STA <TEXTFILE
```

```
340             LDA #>10000
350             STA >TEXTFILE
360    ;
370    ;SEND CARRIAGE RETURN.
380    ;
390             JSR CR
400    ;
410    ;SEND TEXT BYTE BY BYTE TO
420    ;PRINTER, INCLUDING CONTROL
430    ;CHARACTER FOR BUSINESS MODE.
440    ;
450             LDY #0
460    PRINTLOOP LDA #17   ;CONROL CHAR.
470             JSR PRINT
480             LDA (TEXTFILE),Y
490             JSR PRINT
500    ;
510             INC <TEXTFILE
520             BNE NOHIGH
530             INC >TEXTFILE
540    ;
550    NOHIGH   LDA <TEXTFILE
560             CMP #<11000
570             BNE PRINTLOOP
580             LDA >TEXTFILE
590             CMP #>11000
600             BNE PRINTLOOP
610    ;
620    ;SEND FINAL CARRIAGE RETURN.
630    ;
640             JSR CR
650    ;
660    ;FINISHED: CLOSE PRINTER...
670    ;
680             LDA #4
690             JSR CLOSE
700    ;
710             JSR CLRCH
720    ;
730    ;AND RETURN TO BASIC.
740    ;
750             RTS
```

PRG-NAME: BYT'TYPEWRITER
FILENAME: TAPE SAVE

```
10              ORG 50300
20     ;
30     SCREENMEM EQU 251
40     SCREENCOL EQU 253
50     TEXTFILE  EQU 166
60     ;
70     SETNAM    EQU $FFBD
80     SETLFS    EQU $FFBA
90     SAVE      EQU $F5DD
100    ;
110    ;OPEN CHANNELS FOR OUTPUT TO TAPE.
120    ;
130             LDA FILENAME
140             LDX #<FILENAME+1
150             LDY #>FILENAME+1
160             JSR SETNAM
170    ;
180             LDA #0
190             LDX #1
200             LDY #1
210             JSR SETLFS
220    ;
230    ;SET BEGINNING AND END OF SAVE.
240    ;
250             LDA #<10000
260             STA <TEXTFILE
270             LDA #>10000
280             STA >TEXTFILE
290             LDA #TEXTFILE
300    ;
310             LDX #<11001
320             LDY #>11001
330    ;
340    ;SAVE TEXTFILE ONTO TAPE.
350    ;
360             JSR SAVE
370    ;
380    ;FINISHED: RETURN TO BASIC.
390    ;
400             RTS
410    ;
420    ;
430    ;
440    FILENAME  BYT 8,"TEXTFILE"
```

PRG-NAME: BYT'TYPEWRITER
FILENAME: LOAD FILE

```
10              ORG 50200
20     ;
30     SCREENMEM EQU 251
40     SCREENCOL EQU 253
50     TEXTFILE  EQU 166
60     TEXTFILE1 EQU 168
70     ;
80     ST        EQU $90
90     GETIN     EQU $FFE4
100    SETNAM    EQU $FFBD
110    SETLFS    EQU $FFBA
120    OPEN      EQU $FFC0
130    CHKIN     EQU $FFC6
140    CLOSE     EQU $FFC3
150    CLRCH     EQU $FFCC
160    ;
170    ;OPEN CHANNELS FOR DISK INPUT.
180    ;
190             LDA FILENAME
200             LDX #<FILENAME+1
210             LDY #>FILENAME+1
220             JSR SETNAM
230    ;
240             LDA #1
250             LDX #8
260             LDY #0
270             JSR SETLFS
280    ;
```

```
290              JSR OPEN
300     ;
310              LDX #1
320              JSR CHKIN
330     ;
340     ;GET START ADDRESS FROM DISK.
350     ;
360              JSR GETIN
370              STA <TEXTFILE1
380              JSR GETIN
390              STA >TEXTFILE1
400     ;
410     ;GET DATA FROM DISK BYTE BY BYTE
420     ;AND STORE IN TEXTFILE.
430     ;
440     GETLOOP  JSR GETIN
450              LDY #0
460              STA (TEXTFILE1),Y
470              INC <TEXTFILE1
480              BNE NOHIGH
490              INC >TEXTFILE1
500     NOHIGH   LDA ST
510              BEQ GETLOOP
520     ;
530     ;LOADING FINISHED:
540     ;CLOSE DISK INPUT CHANNELS.
550     ;
560              LDA #1
570              JSR CLOSE
580     ;
590              JSR CLRCH
600     ;
610     ;REPRINT TEXTFILE ON SCREEN:
620     ;INITIATE TEXTFILE.
630     ;
640              LDA #<10000
650              STA <TEXTFILE
660              LDA #>10000
670              STA >TEXTFILE
680     ;
690     ;INITIATE SCREEN AND COLOUR VARS.
700     ;
710              LDA #<1024
720              STA <SCREENMEM
730              LDA #>1024
740              STA >SCREENMEM
750     ;
760              LDA #<55296
770              STA <SCREENCOL
780              LDA #>55296
790              STA >SCREENCOL
800     ;
810     ;CLEAR THE SCREEN.
820     ;
830              JSR $E544
840     ;
850     ;SWITCH COMPUTER INTO
860     ;BUSINESS MODE.
870     ;
880              LDA #14
890              JSR $E716
900     ;
910     ;GET CHARACTER FROM TEXTFILE.
920     ;
930              LDY #0
940     PRINTLOOP LDA (TEXTFILE),Y
950     ;
960     ;CONVERT ASCII INTO SCREEN CODE.
970     ;
980              CMP #128
990              BCC SKIP
1000             SBC #64      ;UPPER CASE
1010    SKIP     CMP #64      ;LOWER CASE
1020             BCC PRINT
1030             SBC #64
1040    ;
1050    ;PRINT CHARACTER ONTO SCREEN.
1060    ;
1070    PRINT    STA (SCREENMEM),Y
1080             LDA #6
1090             STA (SCREENCOL),Y
1100    ;
1110    ;ADVANCE TO NEXT PRINT POSITION.
1120    ;
1130             INC <TEXTFILE
1140             BNE NOHIGH1
1150             INC >TEXTFILE
1160    ;
1170    NOHIGH1  INC <SCREENMEM
1180             BNE NOHIGH2
1190             INC >SCREENMEM
1200    ;
1210    NOHIGH2  INC <SCREENCOL
1220             BNE NOHIGH3
1230             INC >SCREENCOL
1240    ;
1250    NOHIGH3  LDA <TEXTFILE
1260             CMP <TEXTFILE1
1270             BNE PRINTLOOP
1280             LDA >TEXTFILE
1290             CMP >TEXTFILE1
1300             BNE PRINTLOOP
1310    ;
1320    ;FINISHED: WAIT FOR KEYPRESS...
1330    ;
1340    WAITKEY  JSR GETIN
1350             BEQ WAITKEY
1360    ;
1370    ;AND EXIT BACK TO BASIC.
1380    ;
1390             RTS
1400    ;
1410    ;
1420    ;
1430    FILENAME  BYT 8,"TEXTFILE"
```

```
PRG-NAME: BYT'TYPEWRITER
FILENAME: SAVE FILE
```

```
10                ORG 50100
20      ;
30      SCREENMEM EQU 251
40      SCREENCOL EQU 253
50      TEXTFILE  EQU 166
60      ;
70      SETNAM    EQU $FFBD
80      SETLFS    EQU $FFBA
90      OPEN      EQU $FFC0
```

```
100   CHKOUT   EQU $FFC9
110   CHROUT   EQU $FFD2
120   CLOSE    EQU $FFC3
130   CLRCH    EQU $FFCC
140   ;
150   ;OPEN CHANNELS FOR OUTPUT TO DISK.
160   ;
170            LDA FILENAME
180            LDX #<FILENAME+1
190            LDY #>FILENAME+1
200            JSR SETNAM
210   ;
220            LDA #3
230            LDX #8
240            LDY #1
250            JSR SETLFS
260   ;
270            JSR OPEN
280   ;
290            LDX #3
300            JSR CHKOUT
310   ;
320   ;NOW SAVE FILE BY SENDING EACH
330   ;BYTE OF THE TEXTFILE TO THE
340   ;DISKDRIVE.
350   ;
360   ;INITIATE BEGINNING OF TEXTFILE.
370   ;
380            LDA #<10000
390            STA <TEXTFILE
400            JSR CHROUT
410            LDA #>10000
420            STA >TEXTFILE
430            JSR CHROUT
440   ;
450   ;SEND EACH BYTE TO THE DISKDRIVE.
460   ;
470   OUTLOOP  LDY #0
480            LDA (TEXTFILE),Y
490            JSR CHROUT
500   ;
510            INC <TEXTFILE
520            BNE NOHIGH
530            INC >TEXTFILE
540   ;
550   NOHIGH   LDA <TEXTFILE
560            CMP #<11000
570            BNE OUTLOOP
580            LDA >TEXTFILE
590            CMP #>11000
600            BNE OUTLOOP
610   ;
620   ;FINISHED: CLOSE DISK CHANNELS...
630   ;
640            LDA #3
650            JSR CLOSE
660   ;
670            JSR CLRCH
680   ;
690   ;AND RETURN TO BASIC.
700   ;
710            RTS
720   ;
730   ;
740   ;
750   FILENAME BYT 8,"TEXTFILE"
```

MAY I INTERRUPT (PART 2)

(continued from May Issue)

```
PROGRAM: MAY I INTERRUPT(PART 2)

1A  4290 DATA 255,54,0,8,2,2,18,
    54,146,5,128,54,138,7,0,54,9
    25
D2  4300 DATA 170,6,106,2,54,146
    ,6,82,128,128,136,54,138,5,1
    46,82,1389
7E  4310 DATA 82,81,82,17,1,1,13
    7,134,69,133,70,133,69,64,15
    3,102,1328
52  4320 DATA 149,85,102,85,85,0
    ,146,82,146,81,82,81,81,1,13
    8,137,1481
29  4330 DATA 133,69,68,128,64,6
    4,0,160,148,144,160,84,144,1
    60,148,4,1678
FE  4340 DATA 144,84,64,80,84,0,
    85,149,165,169,54,170,3,106,
    86,89,1532
D8  4350 DATA 86,85,149,170,170,
    106,106,170,170,169,86,170,1
    70,106,170,169,2252
A4  4360 DATA 150,106,54,170,3,1
    06,54,85,8,86,86,89,86,86,89
    ,86,1344
D0  4370 DATA 85,106,170,170,106
    ,170,170,106,54,170,9,0,21,1
    ,54,0,1392
D1  4380 DATA 6,54,85,3,0,54,85,
    3,0,85,90,105,0,54,85,3,712
EA  4390 DATA 0,170,106,170,0,85
    ,85,106,0,54,170,3,0,85,85,1
    70,1289
CB  4400 DATA 0,168,128,54,0,5,5
    4,5,3,1,54,0,4,54,85,4,619
E0  4410 DATA 0,54,85,3,89,101,9
    0,105,0,54,85,3,106,170,106,
    170,1221
9B  4420 DATA 0,85,85,106,54,170
    ,4,0,85,85,170,54,160,3,128,
    54,1243
41  4430 DATA 0,17,1,5,5,54,85,4
    ,0,54,85,3,86,86,89,86,660
53  4440 DATA 0,102,153,102,170,
    106,170,170,0,54,170,7,0,54,
    170,3,1431
B3  4450 DATA 54,0,5,128,160,160
    ,0,0,2,10,6,25,22,21,25,22,6
    40
50  4460 DATA 25,22,25,22,25,22,
    170,170,169,169,166,169,170,
    170,25,22,1541
4B  4470 DATA 0,86,89,86,0,21,17
    0,170,0,54,170,3,0,85,54,0,9
    88
6B  4480 DATA 3,54,128,3,0,0,102
    ,154,166,54,170,4,102,170,10
    6,153,1369
EF  4490 DATA 100,84,80,64,0,85,
    149,149,165,165,169,169,170,
    169,166,166,2050
06  4500 DATA 154,154,106,106,17
    0,0,54,170,6,168,0,54,170,6,
    0,0,1318
79  4510 DATA 54,170,6,42,54,168
    ,8,54,42,8,168,54,170,6,0,42
    ,1046
8B  4520 DATA 54,170,6,54,0,5,54
    ,170,3,168,54,0,4,54,170,3,9
    69
94  4530 DATA 54,0,5,168,168,170
    ,42,10,202,66,210,112,220,11
    6,221,128,1892
32  4540 DATA 128,160,160,168,16
    8,42,42,119,221,119,221,119,
    221,119,221,54,2282
96  4550 DATA 0,4,42,42,170,168,
    2,2,10,10,42,42,168,168,160,
    161,1191
D6  4560 DATA 131,141,7,29,55,22
    1,54,0,4,54,170,3,42,54,168,
    7,1140
38  4570 DATA 8,54,42,7,32,8,54,
    168,7,0,170,54,168,5,0,0,777

75  4580 DATA 42,10,54,138,3,10,
    0,32,54,42,7,25,149,166,169,
    54,955
B6  4590 DATA 170,3,106,149,101,
    89,150,101,153,166,105,25,25
    ,26,54,25,1448
05  4600 DATA 4,26,149,101,89,15
    0,101,89,86,85,54,0,4,1,1,5,
    945
32  4610 DATA 5,54,0,5,12,15,19,
    54,0,4,3,0,12,207,54,0,444
74  4620 DATA 4,192,192,240,240,
    0,42,10,5,22,10,42,6,21,10,2
    2,1058
E9  4630 DATA 0,6,5,21,0,168,54,
    170,6,168,42,54,170,6,42,0,9
    12
8F  4640 DATA 54,170,6,42,0,54,1
    70,6,168,25,22,21,5,5,1,0,74
    9
C4  4650 DATA 0,169,165,166,54,1
    70,6,102,153,86,89,86,85,22,
    0,128,1481
2F  4660 DATA 160,168,168,54,170
    ,3,2,2,10,10,42,42,168,8,128
    ,128,1263
AC  4670 DATA 160,160,168,168,42
    ,32,21,21,0,85,87,85,87,85,1
    19,223,1543
```

```
38  4680 DATA 0,223,119,223,119,223,255,255,0,54,255,5,252,252,0,54,2289
14  4690 DATA 255,5,0,192,208,243,53,53,77,83,0,0,195,207,204,252,2027
E6  4700 DATA 114,198,10,42,22,22,42,10,0,0,160,168,20,20,168,160,1156
E5  4710 DATA 64,128,54,1,8,54,128,8,96,26,0,25,10,0,1,1,604
C6  4720 DATA 10,168,64,104,160,64,128,128,13,131,161,168,168,54,170,3,1694
6C  4730 DATA 25,22,21,5,69,193,112,221,0,21,1,160,54,168,4,0,1076
00  4740 DATA 168,128,10,54,42,4,54,133,3,129,160,54,168,3,162,162,1434
38  4750 DATA 130,10,54,42,4,54,168,4,160,129,133,133,54,42,4,10,1131
0C  4760 DATA 130,162,162,170,106,153,101,87,93,119,13,116,208,66,74,6,1766
93  4770 DATA 25,22,21,255,239,251,239,251,239,251,255,236,188,236,188,236,3132
A5  4780 DATA 252,0,0,176,240,176,240,54,0,4,255,251,239,251,239,251,2628
B3  4790 DATA 239,255,59,62,59,62,59,63,0,0,14,15,14,15,54,0,970
DF  4800 DATA 4,255,251,239,251,239,251,239,255,0,0,252,236,188,236,188,3084
E7  4810 DATA 236,54,0,4,240,176,240,176,255,239,251,239,251,239,251,255,3106
76  4820 DATA 0,0,63,59,62,59,62,59,54,0,4,15,14,15,14,146,626
28  4830 DATA 138,74,82,74,82,84,2,2,168,162,138,42,66,104,162,253,1633
2D  4840 DATA 241,63,15,3,1,1,61,191,188,128,192,224,248,186,142,254,2138
0A  4850 DATA 255,62,63,15,21,58,253,186,235,184,232,160,88,170,95,0,2077
48  4860 DATA 0,3,15,63,62,255,251,0,0,192,160,232,168,234,170,169,1974
ED  4870 DATA 166,154,105,165,150,90,106,152,150,90,106,54,170,3,106,169,1936
B8  4880 DATA 166,154,105,166,154,106,170,152,152,88,54,152,4,88,0,3,1714
DB  4890 DATA 63,95,127,95,119,95,0,192,252,54,255,5,54,192,3,240,1841
C9  4900 DATA 48,60,79,83,70,18,2,6,8,24,242,198,2,14,60,49,963
DE  4910 DATA 244,193,192,193,128,160,104,24,138,162,134,18,0,42,130,161,2023
B5  4920 DATA 133,130,42,133,133,162,133,160,168,161,133,0,138,130,136,54,1946
A5  4930 DATA 138,6,137,133,69,69,132,66,74,54,168,3,54,40,10,54,1207
F9  4940 DATA 168,3,119,221,119,220,113,209,69,197,116,195,63,95,127,95,2129
49  4950 DATA 119,95,55,193,252,54,255,5,119,221,119,29,199,205,243,241,2404
24  4960 DATA 119,221,119,221,3,60,15,19,119,221,119,220,115,208,12,207,1998
C0  4970 DATA 54,192,3,240,240,124,143,163,68,16,0,1,3,25,242,202,1716
0A  4980 DATA 0,174,188,177,244,193,192,193,0,42,74,18,134,161,133,16,1939
51  4990 DATA 119,221,64,51,53,53,141,163,119,29,195,204,204,252,114,198,2180
42  5000 DATA 113,209,113,209,113,209,113,209,135,141,135,141,135,141,135,141,2392
A1  5010 DATA 160,42,0,41,10,192,113,209,10,168,64,104,160,65,135,141,1614
51  5020 DATA 1,54,161,6,1,128,54,138,6,128,117,222,124,113,196,193,1642
17  5030 DATA 196,193,119,253,207,17,131,160,132,16,54,0,255,54,0,10,1797
A3  5040 DATA 3,7,31,23,0,95,87,0,192,240,252,124,0,255,127,54,1490
45  5050 DATA 0,6,3,0,54,12,7,204,54,0,6,48,192,0,63,0,649
FD  5060 DATA 0,3,54,0,3,63,255,63,204,54,12,4,0,255,0,192,1162
60  5070 DATA 48,54,0,3,54,12,6,54,0,128,255,54,0,5,255,54,982
17  5080 DATA 0,10,255,0,0,255,54,0,8,255,54,0,4,21,85,17,1018
F2  5090 DATA 17,16,255,0,255,54,0,9,3,3,15,15,60,60,240,240,1242
CC  5100 DATA 192,192,54,0,6,128,128,160,224,168,232,186,206,250,14,32,2172
FB  5110 DATA 14,40,2,3,54,0,3,12,12,54,0,36,3,54,15,5,307
BC  5120 DATA 3,240,252,250,229,234,229,250,255,54,0,8,2,10,54,9,2079
17  5130 DATA 5,2,172,104,152,152,151,171,167,88,54,0,4,168,240,224,1854
75  5140 DATA 0,3,54,2,3,1,54,2,3,252,168,168,170,170,90,154,1294
30  5150 DATA 146,54,0,4,128,128,160,176,10,94,87,84,80,64,64,0,1279
7B  5160 DATA 144,64,54,0,6,208,85,85,20,16,54,0,3,170,170,22,1101
E9  5170 DATA 22,170,170,81,170,32,15,96,32,0,56,76,6,96,54,234,1310
64  5180 DATA 6,169,32,160,40,153,199,64,153,239,64,153,23,65,153,63,1736
E0  5190 DATA 65,153,103,65,153,143,65,153,183,65,153,223,65,153,7,66,1815
96  5200 DATA 153,47,66,153,87,66,153,127,66,153,167,66,153,207,66,153,1883
B7  5210 DATA 247,66,153,31,67,153,71,67,153,111,67,153,151,67,153,191,1901
FF  5220 DATA 67,136,208,193,169,250,160,240,153,7,218,153,247,218,136,208,2763
5A  5230 DATA 247,169,253,160,200,153,63,217,136,208,250,169,7,160,39,153,2584
56  5240 DATA 0,216,153,120,216,136,208,247,169,1,160,39,153,40,216,153,2227
78  5250 DATA 160,216,136,208,247,54,234,63,160,39,169,232,153,223,65,136,2495
C6  5260 DATA 208,250,162,12,188,86,97,202,189,86,97,153,63,65,202,208,2268
F0  5270 DATA 243,160,119,185,98,97,153,103,65,136,208,247,96,19,37,5,1971
98  5280 DATA 36,22,35,9,34,12,33,5,6,18,5,15,4,3,3,19,259
F1  5290 DATA 2,147,77,133,76,150,75,137,74,140,73,133,46,146,45,143,1597
CB  5300 DATA 44,131,43,147,42,3,23,1,22,16,21,20,19,5,18,10,565
48  5310 DATA 17,131,63,129,62,144,61,148,59,133,58,138,57,4,108,12,1324
95  5320 DATA 107,5,106,9,105,8,104,19,103,132,148,140,147,133,146,137,1549
ED  5330 DATA 145,136,144,147,143,14,97,15,96,19,95,9,94,15,93,16,1278
CB  5340 DATA 92,142,137,143,136,147,135,137,134,143,133,144,132,245,32,241,2273
D4  5350 DATA 31,245,28,241,27,245,13,241,12,54,32,4,241,245,54,32,1745
4B  5360 DATA 4,238,242,246,252,32,32,241,245,241,245,241,245,54,32,3,2593
EA  5370 DATA 238,243,248,252,238,243,247,252,32,32,241,245,54,32,6,238,2841
04  5380 DATA 239,243,245,241,245,238,239,243,247,250,252,238,239,251,242,246,3898
DA  5390 DATA 254,243,245,32,238,239,243,247,250,254,243,243,250,245,238,242,3706
47  5400 DATA 246,252,32,32,233,234,235,236,240,244,248,237,251,236,240,244,3440
C1  5410 DATA 248,250,250,254,249,236,244,248,250,254,248,253,236,240,244,248,3952
AA  5420 DATA 250,250,254,243,248,251,240,244,248,250,252,169,0,141,32,208,3280
BD  5430 DATA 141,33,208,173,2,221,9,3,141,2,221,173,0,221,41,252,1841
40  5440 DATA 9,2,141,0,221,120,169,31,141,13,220,141,13,221,173,13,1628
94  5450 DATA 220,173,13,221,173,17,208,41,127,141,17,208,169,106,141,18,1993
E0  5460 DATA 208,169,71,141,20,3,169,193,141,21,3,169,1,141,26,208,1684
8F  5470 DATA 88,96,54,0,233,54,234,34,169,255,141,27,208,169,2,141,1905
4B  5480 DATA 35,208,169,6,141,34,208,169,3,141,16,208,160,23,136,152,1809
4E  5490 DATA 153,230,67,192,3,208,247,169,1,160,6,153,38,208,136,208,2179
77  5500 DATA 250,169,255,141,39,208,141,40,208,169,255,141,21,208,169,114,2528
45  5510 DATA 160,12,153,255,207,136,136,208,249,169,24,141,0,208,169,48,2275
02  5520 DATA 141,2,208,169,64,141,4,208,169,144,141,6,208,169,224,141,2139
```

```
84   5530 DATA 8,208,169,4,141,24
     ,208,173,67,196,41,7,9,16,14
     1,22,1434
8E   5540 DATA 208,169,154,141,18
     ,208,169,1,141,25,208,169,69
     ,141,20,3,1844
8C   5550 DATA 169,197,141,21,3,7
     6,49,234,54,0,255,0,234,234,
     169,5,1841
48   5560 DATA 141,38,208,169,6,1
     41,37,208,169,9,141,41,208,1
     41,40,208,1905
71   5570 DATA 169,4,141,21,208,1
     41,28,208,169,25,141,250,67,
     169,17,141,1899
BD   5580 DATA 249,67,169,82,141,
     5,208,141,3,208,169,77,141,4
     ,208,169,2041
E7   5590 DATA 47,141,2,208,169,4
     ,141,24,208,169,8,141,22,208
     ,238,67,1797
9E   5600 DATA 196,173,67,196,41,
     7,240,3,76,98,195,160,38,185
     ,64,65,1804
AD   5610 DATA 153,65,65,185,104,
     65,153,105,65,185,144,65,153
     ,145,65,185,1902
75   5620 DATA 184,65,153,185,65,
     185,224,65,153,225,65,136,16
     ,223,173,103,2220
AE   5630 DATA 65,141,64,65,173,1
     43,65,141,104,65,173,183,65,
     141,144,65,1797
9C   5640 DATA 173,223,65,141,184
     ,65,173,7,66,141,224,65,54,2
     34,3,238,2056
AC   5650 DATA 68,196,238,68,196,
     173,68,196,41,7,240,3,76,41,
     196,160,1967
EF   5660 DATA 38,185,8,66,153,9,
     66,185,48,66,153,49,66,185,8
     8,66,1431
6C   5670 DATA 153,89,66,185,128,
     66,153,129,66,185,168,66,153
     ,169,66,185,2027
87   5680 DATA 208,66,153,209,66,
     185,248,66,153,249,66,185,32
     ,67,153,33,2139
5E   5690 DATA 67,185,72,67,153,7
     3,67,185,112,67,153,113,67,1
     85,152,67,1785
1D   5700 DATA 153,153,67,185,192
     ,67,153,193,67,136,16,181,17
     2,255,63,185,2238
31   5710 DATA 255,8,201,32,208,2
     ,169,231,141,8,66,185,254,9,
     201,32,2002
07   5720 DATA 208,2,169,230,141,
     48,66,185,253,10,201,32,208,
     2,169,227,2151
E9   5730 DATA 141,88,66,185,252,
     11,141,128,66,185,251,12,201
     ,32,208,2,1969
9C   5740 DATA 169,229,141,168,66
     ,185,250,13,141,208,66,185,2
     49,14,141,248,2473
ED   5750 DATA 66,185,248,15,141,
     32,67,185,247,16,201,32,208,
     2,169,228,2042
74   5760 DATA 141,72,67,185,246,
     17,141,112,67,185,245,18,141
     ,152,67,136,1992
7B   5770 DATA 140,255,63,169,64,
     141,20,3,169,193,141,21,3,16
     9,105,141,1797
D9   5780 DATA 18,208,169,1,141,2
     5,208,104,168,104,170,104,64
     ,104,204,54,1846
F5   5790 DATA 0,255,0,54,234,4,1
     69,14,141,35,208,169,6,141,2
     4,208,1662
34   5800 DATA 173,68,196,41,7,9,
     16,141,22,208,169,250,141,18
     ,208,169,1836
3F   5810 DATA 1,141,25,208,169,2
     10,141,20,3,169,194,141,21,3
     ,76,49,1571
6A   5820 DATA 234,192,0,0,0,0,0,
     0,0,0,0,0,0,0,0,0,426
0F   5830 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
75   5840 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
4A   5850 BL=2:LN=5890:SA=50195
F5   5860 FOR L=0 TO BL:CX=0:FOR
     D=0 TO 15:READ A:CX=CX+A:POK
     E SA+L*16+D,A
A5   5865 POKE53280,A:NEXTD
AF   5870 READ A:IF A<>CX THENPRI
     NT"ERROR IN LINE";LN+(L*10):
     STOP
B8   5880 NEXT L:SYS50195
81   5890 DATA 169,32,133,250,169
     ,8,133,251,169,0,133,252,169
     ,160,133,253,2414
10   5900 DATA 169,54,133,1,160,0
     ,177,252,145,250,200,208,249
     ,230,251,230,2709
95   5910 DATA 253,165,253,201,19
     7,208,239,169,55,133,1,76,32
     ,8,0,0,1990
```

BASIC LISTER

PROGRAM:BASIC LISTER

```
84   1 REM *********************
     ***********
A0   2 REM BASIC PROGRAM & DIRECT
     ORY
56   3 REM DISC LISTER
42   4 REM BY
A2   5 REM STEPHEN BURKE
65   6 REM FOR THE
9C   7 REM C64  & 1541
AC   8 REM MARCH  1988
8C   9 REM *********************
     ***********
30   10 :
64   11 REM *********************
     ***********
DE   12 REM SYNTAX:SYS49182,"NAME
     "
4A   13 REM     OR:          ,"NAME
     "
61   14 REM *********************
     ***********
35   15 :
BF   16 REM *********************
     ***********
28   17 :
E6   18 J=828 :  REM KEY ',' WEDG
     E
29   19 :
D8   20 FOR F=J TO J+49:READA:POK
     EF,A
12   21 R=R+A:NEXTF
57   22 IF R<>  5383 THENPRINT"ER
     ROR!":STOP
2D   23 :
B7   24 REM *********************
     ***********
23   25 :
A3   26 DATA 162,2,189,107,3,157,
     124,0
91   27 DATA 202,16,247,96,201,44
     ,240,7
0C   28 DATA 201,58,176,20,76,128
     ,0,104
75   29 DATA 201,140,208,8,104,20
     1,164,240
57   30 DATA 8,72,169,140,72,169,
     44,56
1F   31 DATA 96,32,0,192,76,116,1
     64,76,72,3
1A   32 :
CE   33 REM *********************
     ***********
18   34 :
33   35 K=49152:  REM BASIC LISTE
     R
1E   36 :
89   37 FOR F=K TO K+258:READA:PO
     KEF,A
61   38 S=S+A:NEXTF
C3   39 IF S<>36435 THENPRINT"ERR
     OR!":STOP
12   40 :
C6   41 REM *********************
     ***********
10   42 :
85   43 DATA 32,115,0,240,5,32,87
     ,226
05   44 DATA 176,1,96,173,255,159
     ,201,36
60   45 DATA 208,3,76,4,193,169,2
     ,162
5D   46 DATA 8,160,0,32,186,255,3
     2,192
13   47 DATA 255,169,0,32,189,255
     ,169,15
40   48 DATA 162,8,160,15,32,186,
     255,32
B1   49 DATA 192,255,162,15,32,19
     8,255,160
6F   50 DATA 2,32,207,255,201,48,
     208,5
1D   51 DATA 136,208,246,240,32,3
     2,207,255
BC   52 DATA 32,207,255,32,207,25
     5,201,44
C9   53 DATA 240,5,32,210,255,208
     ,244,169
89   54 DATA 15,32,195,255,169,2,
     32,195
F4   55 DATA 255,32,204,255,96,16
     2,2,32
88   56 DATA 198,255,32,207,255,3
     2,207,255
81   57 DATA 165,145,201,127,240,
     225,201,239
17   58 DATA 240,246,32,207,255,3
     2,207,255
F9   59 DATA 240,213,32,207,255,7
     2,32,207
39   60 DATA 255,168,104,170,152,
     32,205,189
73   61 DATA 169,32,32,210,255,32
     ,207,255
FA   62 DATA 208,7,169,13,32,210,
     255,208
C4   63 DATA 207,201,34,208,16,32
     ,241,192
FF   64 DATA 32,207,255,201,34,24
     0,18,201
87   65 DATA 13,240,14,208,240,13
     3,252,165
81   66 DATA 212,208,6,165,252,20

     1,128,176
18   67 DATA 5,32,241,192,144,207
     ,41,127
33   68 DATA 133,252,230,252,162,
     0,160,0
53   69 DATA 185,157,160,201,128,
     144,1,232
6C   70 DATA 200,228,252,208,243,
     240,4,32
BF   71 DATA 241,192,200,185,157,
     160,201,128
58   72 DATA 144,245,41,127,32,24
```

```
    1,192,144
A3  73 DATA 164,201,32,144,3,32,
    210,255
19  74 DATA 96,0,0,0,0,0,0,0,0,0
    ,96
71  75 :
E3  76 REM *********************
    ***********
77  77 :
12  78 I=49401:  REM DIRECTORY L
    ISTER
75  79 :
BD  80 FOR F=I TO I+130:READA:PO
    KEF,A
CA  81 T=T+A:NEXTF
E7  82 IF T<>20157 THENPRINT"ERR
    OR!":STOP
69  83 :
FB  84 REM *********************
    ***********
6F  85 :
C2  86 DATA 169,2,32,195,255,32,
    204
87  87 DATA 255,96,36,48,169,2,1
    62,2
CD  88 DATA 160,193,32,189,255,1
    69,2,162
3A  89 DATA 8,160,0,32,186,255,3
    2,192
99  90 DATA 255,162,2,32,198,255
    ,32,207
A3  91 DATA 255,32,207,255,32,20
    7,255,32
D4  92 DATA 207,255,32,207,255,1
    70,32,207
11  93 DATA 255,32,205,189,169,3
    2,32,210
85  94 DATA 255,32,207,255,168,1
    65,144,208
89  95 DATA 184,152,32,210,255,3
    2,207,255
FA  96 DATA 201,34,240,5,32,210,
    255,208
59  97 DATA 244,32,210,255,32,20
    7,255,32
34  98 DATA 210,255,32,207,255,2
    40,5,32
69  99 DATA 210,255,208,246,169,
    13,32,210
2F  100 DATA 255,165,145,201,127
    ,240,138,201
E9  101 DATA 239,240,246,165,144
    ,240,173,76
8F  102 DATA 249,192,96,240
5D  103 :
DD  104 REM ********************
    ***********
53  105 :
A6  106 SYS J   : REM ACTIVATE WE
    DGE
51  107 :
D9  108 REM ********************
    ***********
```

30K RAM DISK

PROGRAM:RAM DISK

```
34  10 BL=89:LN=50:SA=32768
61  20 FORL=0TOBL:CX=0:FORD=0TO1
    5:READA:CX=CX+A:POKESA+L*16+
    D,A:POKE53280,A:NEXTD
B5  30 READA:IFA<>CXTHENPRINT"ER
    ROR IN LINE";LN+(L*10):STOP
F6  40 NEXTL
FF  43 POKE43,0:POKE44,128:POKE4
    5,146:POKE46,133:SAVE"30K RA
    M DISK",DEVICE
72  45 REM CHANGE 'DEVICE' TO 1
    FOR CASSETTE OR 8 FOR DISK.
2A  47 REM USE 'SYS32768' TO INI
    TIALISE.
98  50 DATA 169,127,133,56,133,5
    2,141,132,2,169,255,133,55,1
    33,51,141,1882
43  60 DATA 131,2,32,0,131,160,3
    ,32,77,133,169,32,133,115,17
    3,61,1384
05  70 DATA 128,133,116,173,62,1
    28,133,117,169,234,133,118,1
    33,119,133,120,2149
DC  80 DATA 173,63,128,141,24,3,
    173,64,128,141,25,3,96,38,12
    9,130,1459
01  90 DATA 129,4,6,2,2,243,0,13
    4,6,3,0,0,253,12,0,54,848
68  100 DATA 147,64,148,64,156,6
    4,69,82,65,83,69,64,67,65,84
    ,64,1355
AE  110 DATA 130,64,0,181,129,33
    ,130,0,131,22,131,59,132,155
    ,132,117,1554
D3  120 DATA 128,129,128,151,128
    ,32,66,89,84,69,83,32,70,82,
    69,69,1409
17  130 DATA 0,13,82,65,77,32,68
    ,73,83,75,32,67,79,78,84,69,
    977
4E  140 DATA 78,84,83,58,13,13,0
    ,82,65,77,32,68,73,83,75,32,
    916
20  150 DATA 86,69,82,83,73,79,7
    8,32,49,46,48,13,70,46,87,65
    ,1006
12  160 DATA 71,73,69,84,32,49,5
    7,56,56,13,70,79,82,32,89,79
    ,991
B9  170 DATA 85,82,32,67,79,77,7
    7,79,68,79,82,69,13,13,0,217
    ,1119
99  180 DATA 128,236,128,253,128
    ,9,129,23,129,73,78,67,79,82
    ,82,69,1693
FF  190 DATA 67,84,32,70,73,76,6
    9,78,65,77,69,0,70,73,76,69,
    1048
E8  200 DATA 32,78,79,84,32,80,8
    2,69,83,69,78,84,0,70,73,76,
    1069
3D  210 DATA 69,32,69,88,73,83,8
    4,83,0,82,65,77,32,68,73,83,
    1061
C8  220 DATA 75,32,70,85,76,76,0
    ,68,73,82,69,67,84,79,82,89,
    1107
7E  230 DATA 32,70,85,76,76,0,23
    0,122,208,2,230,123,160,0,17
    7,122,1713
D3  240 DATA 201,172,240,13,152,
    24,101,122,133,122,165,123,1
    05,0,133,123,1929
51  250 DATA 95,200,162,0,142,65
    ,128,177,122,221,80,128,208,
    4,232,200,2165
92  260 DATA 208,245,189,80,128,
    240,233,201,64,240,17,238,65
    ,128,160,1,2437
28  270 DATA 232,189,80,128,201,
    64,208,248,232,76,71,129,32,
    52,129,173,2244
71  280 DATA 65,128,10,168,185,9
    9,128,133,251,200,185,99,128
    ,133,252,108,2272
48  290 DATA 251,0,72,138,72,152
    ,72,169,105,141,22,3,141,46,
    3,169,1556
F3  300 DATA 127,141,13,221,172,
    13,221,48,25,32,2,253,208,3,
    108,2,1589
5B  310 DATA 128,32,188,246,32,2
    25,255,208,9,32,163,253,32,2
    4,229,108,2164
84  320 DATA 2,160,76,114,254,32
    ,175,132,173,73,128,201,3,24
    0,3,76,1842
1F  330 DATA 36,133,32,105,133,1
    72,72,128,200,177,251,133,34
    ,200,177,251,2234
BE  340 DATA 133,35,200,177,251,
    141,74,128,200,177,251,141,7
    5,128,165,43,2319
A4  350 DATA 133,36,165,44,133,3
    7,32,133,133,160,0,177,34,14
    5,36,230,1628
9E  360 DATA 34,208,2,230,35,230
    ,36,208,2,230,37,165,35,205,
    75,128,1860
B5  370 DATA 144,233,165,34,205,
    74,128,144,226,165,36,133,45
    ,165,37,133,2067
0C  380 DATA 46,32,139,133,165,1
    23,201,2,240,6,32,89,166,76,
    174,167,1791
FA  390 DATA 96,32,175,132,173,7
    3,128,201,2,240,3,76,36,133,
    169,255,1924
3C  400 DATA 56,237,68,128,141,7
    6,128,169,255,237,69,128,141
    ,77,128,165,2203
D8  410 DATA 45,56,229,43,141,78
    ,128,165,46,229,44,141,79,12
    8,24,173,1749
56  420 DATA 77,128,205,79,128,1
    76,26,144,8,173,76,128,205,7
    8,128,176,1935
C2  430 DATA 16,169,4,141,73,128
    ,76,36,133,169,5,141,73,128,
    76,36,1404
4D  440 DATA 133,160,0,173,67,12
    8,201,10,176,239,238,67,128,
    173,72,128,2093
D4  450 DATA 145,251,32,119,133,
    177,34,145,251,200,204,72,12
    8,144,246,173,2454
0C  460 DATA 68,128,145,251,200,
    173,69,128,145,251,200,173,6
    8,128,24,109,2260
D6  470 DATA 78,128,141,78,128,1
    45,251,200,173,69,128,109,79
    ,128,141,79,2055
F3  480 DATA 128,145,251,200,169
    ,0,145,251,160,0,165,43,133,
    34,165,44,2033
5E  490 DATA 133,35,173,68,128,1
    33,36,173,69,128,133,37,32,1
    33,133,177,1721
EB  500 DATA 34,145,36,230,34,20
    8,2,230,35,230,36,208,2,230,
    37,165,1862
76  510 DATA 35,197,46,144,234,1
    65,34,197,45,144,228,173,78,
    128,24,105,1977
DA  520 DATA 1,141,68,128,173,79
    ,128,105,0,141,69,128,32,139
    ,133,96,1561
A9  530 DATA 169,0,141,67,128,14
    1,68,128,141,70,128,169,135,
    141,69,128,1823
17  540 DATA 169,134,141,71,128,
    96,32,175,132,173,73,128,201
    ,3,240,3,1899
BD  550 DATA 76,36,133,32,105,13
    3,32,133,133,160,0,165,251,1
    41,76,128,1734
9E  560 DATA 165,252,141,77,128,
    177,251,24,105,1,101,251,133
    ,251,165,252,2474
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53  570 DATA 105,0,133,252,177,2
    51,141,78,128,200,177,251,14
    1.79.128.200.2441
6B  580 DATA 177,251,141,74,128,
    200,177,251,141,75,128,160,0
    ,173,74,128,2278
2D  590 DATA 24,105,1,141,74,128
    ,133,251,173,75,128,105,0,14
    1,75,128,1682
47  600 DATA 133,252,173,78,128,
    133,34,173,79,128,133,35,177
    ,251,145,34,2086
2E  610 DATA 230,251,208,2,230,2
    52,230,34,208,2,230,35,165,2
    52,208,236,2773
BB  620 DATA 165,251,208,232,173
    ,74,128,56,237,78,128,141,74
    ,128,173,75,2321
3E  630 DATA 128,237,79,128,141,
    75,128,173,76,128,133,251,17
    3,77,128,133,2188
D0  640 DATA 252,160,0,177,251,2
    4,105,5,101,251,133,36,165,2
    52,105,0,2017
16  650 DATA 133,37,177,36,145,2
    51,230,36,208,2,230,37,230,2
    51,208,2,2213
1F  660 DATA 230,252,165,36,208,
    236,173,76,128,133,251,173,7
    7,128,133,252,2651
C5  670 DATA 160,0,177,251,240,6
    2,24,105,1,101,251,133,251,1
    65,252,105,2278
02  680 DATA 0,133,252,177,251,5
    6,237,74,128,145,251,200,177
    ,251,237,75,2644
92  690 DATA 128,145,251,200,177
    ,251,56,237,74,128,145,251,2
    00,177,251,237,2908
06  700 DATA 75,128,145,251,200,
    152,24,101,251,133,251,165,2
    52,105,0,133,2366
92  710 DATA 252,76,224,131,32,1
    39,133,173,68,128,56,237,74,
    128,141,68,2060
3D  720 DATA 128,173,69,128,237,
    75,128,141,69,128,96,160,2,3
    2,77,133,1776
18  730 DATA 173,67,128,240,57,1
    73,70,128,133,251,173,71,128
    ,133,252,160,2337
EA  740 DATA 0,177,251,240,41,14
    1,66,128,32,119,133,177,251,
    32,210,255,2253
D0  750 DATA 200,204,66,128,144,
    245,173,66,128,24,101,251,10
    5,4,133,251,2223
20  760 DATA 165,252,105,0,133,2
    52,169,13,32,210,255,76,79,1
    32,169,13,2055
D4  770 DATA 32,210,255,169,255,
    56,237,68,128,133,57,169,255
    ,237,69,128,2458
99  780 DATA 133,58,32,201,189,1
    60,1,32,77,133,96,32,175,132
    ,173,73,1697
EC  790 DATA 128,201,3,240,3,76,
    36,133,169,0,133,123,76,194,
    129,32,1676
82  800 DATA 158,173,32,163,182,
    24,208,6,169,1,141,73,128,96
    ,201,17,1772
59  810 DATA 144,9,76,184,132,16
    9,2,141,73,128,96,141,72,128
    ,173,70,1738
0A  820 DATA 128,133,251,173,71,
    128,133,252,173,67,128,208,3
    ,76,197,132,2253
40  830 DATA 160,0,177,251,240,2
    23,205,72,128,240,16,24,105,
    5,101,251,2198
DD  840 DATA 133,251,165,252,105
    ,0,133,252,76,224,132,32,119
    ,133,172,72,2251
1E  850 DATA 128,136,177,251,209
    ,34,208,9,136,16,247,169,3,1
    41,73,128,2065
79  860 DATA 96,173,72,128,24,10
    1,251,105,4,133,251,165,252,
    105,0,133,1993
A9  870 DATA 252,76,224,132,206,
    73,128,173,73,128,10,168,185
    ,207,128,133,2296
AE  880 DATA 34,200,185,207,128,
    133,35,160,0,177,34,240,6,32
    ,210,255,2036
08  890 DATA 200,208,246,165,157
    ,201,128,240,3,76,194,189,96
    ,136,152,10,2401
DB  900 DATA 168,185,111,128,133
    ,251,200,185,111,128,133,252
    ,160,0,177,251,2573
7A  910 DATA 240,6,32,210,255,20
    0,208,246,96,165,251,56,233,
    1,133,251,2583
2A  920 DATA 165,252,233,0,133,2
    52,96,165,251,24,105,1,133,2
    51,165,252,2478
EF  930 DATA 105,0,133,252,96,12
    0,169,48,133,1,96,169,55,133
    ,1,88,1599
5E  940 DATA 96,47,250,0,0,0,0,0
    ,0,0,0,0,0,0,0,0,393
```

SECTOR EDITOR

PROGRAM:SECTOR EDITOR

```
57  10 BL=175:LN=50:SA=49152
61  20 FORL=0TOBL:CX=0:FORD=0TO1
    5:READA:CX=CX+A:POKESA+L*16+
    D,A:POKE53280,A:NEXTD
B5  30 READA:IFA<>CXTHENPRINT"ER
    ROR IN LINE";LN+(L*10):STOP
F6  40 NEXTL
AC  43 POKE43,0:POKE44,192:POKE4
    5,240:POKE46,202:SAVE"SECTOR
     EDITOR",DEVICE
72  45 REM CHANGE 'DEVICE' TO 1
    FOR CASSETTE OR 8 FOR DISK.
C2  47 REM USE 'SYS49469' TO INI
    TIALISE.
E3  50 DATA 123,193,190,195,165,
    193,158,194,153,193,147,193,
    9,194,249,194,2743
2E  60 DATA 205,195,35,0,0,0,0,0
    ,0,0,0,0,207,0,0,0,642
D8  70 DATA 0,0,136,147,148,19,2
    0,0,30,55,56,57,49,32,89,76,
    914
95  80 DATA 85,74,58,58,78,79,84
    ,76,85,70,32,69,75,73,77,32,
    1105
72  90 DATA 89,66,58,58,82,79,84
    ,73,68,69,32,82,79,84,67,69,
    1139
1C  100 DATA 83,147,18,31,154,49
    ,46,32,82,69,65,68,32,84,47,
    83,1090
06  110 DATA 32,32,52,46,32,76,6
    5,83,84,32,84,47,83,32,32,55
    ,867
D7  120 DATA 46,32,69,68,73,84,3
    2,84,47,83,32,32,32,50,46,32
    ,842
8A  130 DATA 87,82,73,84,69,32,8
    4,47,83,32,53,46,32,65,83,67
    ,1019
07  140 DATA 73,73,47,72,69,88,3
    2,56,46,32,69,82,82,79,82,32
    ,1014
4B  150 DATA 67,72,78,32,32,51,4
    6,32,78,69,88,84,32,84,47,83
    ,975
D9  160 DATA 32,32,54,46,32,80,8
    2,73,78,84,32,84,47,83,32,57
    ,928
10  170 DATA 46,32,84,82,65,67,6
    9,32,70,73,76,69,32,146,28,3
    2,1003
11  180 DATA 32,32,32,32,32,32,3
    2,32,32,32,32,32,32,32,32,70
    ,550
7E  190 DATA 55,45,65,66,79,82,8
    4,151,84,82,65,67,75,13,32,4
    8,1093
6F  200 DATA 48,13,13,83,69,67,8
    4,82,13,32,48,48,70,157,50,1
    57,1034
F5  210 DATA 45,157,67,157,79,15
    7,78,157,70,157,73,157,82,15
    7,77,157,1827
3D  220 DATA 85,49,58,48,53,32,4
    8,48,32,49,56,32,48,48,0,66,
    752
16  230 DATA 45,80,32,48,53,32,4
    8,48,0,84,79,32,83,67,82,69,
    882
69  240 DATA 69,78,32,79,82,32,8
    0,82,73,78,84,69,82,32,129,2
    55,1336
0D  250 DATA 32,132,255,32,251,1
    95,32,59,200,120,169,60,141,
    20,3,169,1870
EA  260 DATA 195,141,21,3,88,32,
    173,196,56,233,48,144,248,17
    0,233,10,1991
03  270 DATA 176,243,160,0,202,2
    40,5,200,200,76,100,193,185,
    0,192,141,2313
01  280 DATA 24,192,185,1,192,14
    1,25,192,108,24,192,32,59,20
    0,32,208,1807
B5  290 DATA 196,32,222,195,32,1
    22,197,32,192,197,32,121,201
    ,32,222,195,2220
E4  300 DATA 76,85,193,32,127,19
    8,76,85,193,32,222,195,32,22
    1,198,32,1997
92  310 DATA 222,195,76,85,193,3
    2,222,195,173,0,207,201,37,1
    6,84,201,2139
B7  320 DATA 0,240,80,141,23,192
    ,173,1,207,201,22,141,26,192
    ,16,67,1722
44  330 DATA 160,0,185,25,193,14
    5,179,200,192,5,208,246,165,
    179,24,105,2211
C8  340 DATA 5,133,179,173,23,19
    2,141,22,192,32,43,197,162,4
    ,160,1,1659
E7  350 DATA 32,133,201,162,7,16
    0,1,24,32,240,255,173,26,192
    ,141,22,1801
EC  360 DATA 192,32,43,197,32,13
    7,201,32,0,197,32,122,197,32
    ,192,197,1835
A8  370 DATA 32,121,201,32,222,1
    95,76,85,193,162,2,160,7,173
    ,30,192,1883
C0  380 DATA 240,1,200,24,32,240
    ,255,169,0,133,204,32,228,25
    5,201,0,2214
4C  390 DATA 240,249,201,13,208,
    17,32,222,195,32,192,197,32,
    121,201,32,2184
79  400 DATA 222,195,230,204,76,
    85,193,32,62,199,176,66,133,
    53,56,32,2014
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94  410 DATA 240,255,138,72,152,
    72,165,53,32,210,255,72,173,
    30,192,240,2351
12  420 DATA 10,104,32,15,200,32
    ,194,199,76,101,194,104,32,7
    4,199,32,1598
B5  430 DATA 194,199,32,192,197,
    104,168,104,170,200,24,32,24
    0,255,173,30,2314
3D  440 DATA 192,240,5,169,29,32
    ,210,255,32,194,199,76,27,19
    4,72,165,2091
ED  450 DATA 207,208,252,104,32,
    210,255,72,173,30,192,240,10
    ,104,72,32,2193
D6  460 DATA 35,200,169,29,32,21
    0,255,104,32,194,199,76,27,1
    94,160,0,1916
D0  470 DATA 165,179,56,233,5,48
    ,56,133,179,177,179,153,25,1
    93,200,192,2173
B3  480 DATA 5,208,246,173,25,19
    3,141,24,192,173,26,193,141,
    25,192,32,1989
00  490 DATA 99,200,162,4,160,1,
    32,133,201,173,28,193,141,24
    ,192,173,1916
5B  500 DATA 29,193,141,25,192,3
    2,99,200,162,7,160,1,32,133,
    201,32,1639
D8  510 DATA 222,195,32,122,197,
    32,192,197,173,30,192,240,6,
    206,30,192,2258
1B  520 DATA 32,221,198,32,222,1
    95,76,85,193,162,19,160,4,24
    ,32,240,1895
AE  530 DATA 255,169,156,32,210,
    255,169,8,32,177,255,169,111
    ,32,147,255,2432
B0  540 DATA 32,174,255,169,8,32
    ,180,255,169,111,32,150,255,
    32,165,255,2274
D7  550 DATA 201,13,240,6,32,22,
    231,76,29,195,32,228,255,201
    ,0,240,2001
1F  560 DATA 249,32,194,201,169,
    151,32,210,255,76,85,193,32,
    234,255,165,2533
55  570 DATA 204,208,41,198,205,
    208,37,169,20,133,205,164,21
    1,70,207,174,2454
05  580 DATA 135,2,177,209,176,1
    7,230,207,133,206,32,36,234,
    177,243,141,2355
88  590 DATA 135,2,174,134,2,165
    ,206,73,128,32,28,234,165,1,
    41,16,1536
3D  600 DATA 240,24,173,57,192,2
    01,70,208,57,173,60,192,201,
    75,208,50,2181
0B  610 DATA 160,0,132,192,165,1
    ,9,32,208,8,165,192,208,6,16
    5,1,1644
C3  620 DATA 41,31,133,1,32,135,
    234,166,198,240,23,189,118,2
    ,160,4,1707
9D  630 DATA 217,34,192,240,11,1
    36,208,248,217,34,192,240,14
    ,76,178,195,2432
20  640 DATA 198,198,173,13,220,
    104,168,104,170,104,64,76,22
    6,252,32,190,2292
31  650 DATA 200,32,23,201,32,48
    ,201,32,59,200,76,85,193,32,
    150,201,1765
D3  660 DATA 176,6,32,208,196,76
    ,213,201,32,208,196,76,75,20
    2,173,31,2101
FE  670 DATA 192,208,12,173,17,2
    08,41,239,141,17,208,238,31,
    192,96,173,2186
37  680 DATA 17,208,9,16,141,17,
    208,206,31,192,96,160,44,169
    ,6,141,1661
EF  690 DATA 32,208,169,1,141,33
    ,208,32,222,195,185,39,192,3
    2,210,255,2154
F0  700 DATA 136,208,247,24,162,
    1,160,7,32,240,255,162,48,16
    0,32,152,2026
CA  710 DATA 32,210,255,138,32,2
    10,255,232,224,58,208,243,16
    2,65,152,32,2508
D7  720 DATA 210,255,138,32,210,
    255,232,224,71,208,243,169,1
    ,133,176,169,2726
DA  730 DATA 5,133,177,169,47,13
    3,178,24,164,177,230,176,166
    ,176,32,240,2227
31  740 DATA 255,230,178,165,178
    ,201,58,208,4,169,65,133,178
    ,32,210,255,2519
4E  750 DATA 169,48,32,210,255,1
    65,178,201,70,208,220,173,19
    ,192,208,3,2351
56  760 DATA 32,185,196,160,0,13
    2,177,162,21,134,176,24,32,2
    40,255,160,2086
D0  770 DATA 0,185,84,192,32,210
    ,255,200,192,147,208,245,24,
    162,19,160,2315
99  780 DATA 0,32,240,255,32,222
    ,195,162,3,160,0,24,32,240,2
    55,160,2012
92  790 DATA 0,185,231,192,32,21
    0,255,200,192,21,208,245,96,
    169,0,133,2369
9E  800 DATA 198,32,228,255,201,
    0,240,249,96,160,0,152,153,0
    ,207,200,2371
F1  810 DATA 208,250,169,151,32,
    210,255,32,192,197,169,18,32
    ,210,255,96,2476
2A  820 DATA 162,4,134,176,160,1
    ,132,177,24,32,240,255,169,0
    ,133,198,1997
93  830 DATA 32,79,197,173,22,19
    2,141,23,192,162,7,134,176,1
    64,177,24,1895
B4  840 DATA 32,240,255,169,0,13
    3,198,32,79,197,173,22,192,1
    41,26,192,2081
03  850 DATA 173,23,192,141,22,1
    92,32,37,198,173,24,192,141,
    25,193,173,1931
7C  860 DATA 25,192,141,26,193,1
    73,26,192,141,22,192,32,37,1
    98,173,24,1787
D3  870 DATA 192,141,28,193,173,
    25,192,141,29,193,96,24,173,
    22,192,72,1886
74  880 DATA 41,15,105,246,144,2
    ,105,6,105,58,141,25,192,104
    ,74,74,1437
6F  890 DATA 74,74,24,105,246,14
    4,2,105,6,105,58,141,24,192,
    96,32,1428
B4  900 DATA 207,255,201,58,48,3
    ,56,233,7,10,10,10,10,141,22
    ,192,1463
78  910 DATA 32,207,255,201,58,4
    8,3,56,233,7,41,15,13,22,192
    ,141,1524
62  920 DATA 22,192,22,207,255,2
    01,13,208,249,96,32,150,200,
    162,15,32,2066
4F  930 DATA 201,255,160,0,185,1
    6,193,32,210,255,200,192,15,
    208,245,32,2399
91  940 DATA 204,255,172,27,192,
    132,251,173,28,192,133,252,1
    62,5,32,198,2408
FE  950 DATA 255,32,207,255,145,
    251,200,208,248,32,171,255,3
    2,174,255,169,2889
25  960 DATA 5,32,195,255,169,15
    ,32,195,255,32,231,255,32,66
    ,246,96,2111
6A  970 DATA 173,27,192,133,251,
    173,28,192,133,252,169,1,133
    ,176,169,7,2209
91  980 DATA 133,177,230,176,24,
    166,176,164,177,32,240,255,1
    60,0,177,251,2538
5B  990 DATA 141,22,192,152,72,3
    2,43,197,104,168,173,29,192,
    208,15,169,1909
74  1000 DATA 18,32,210,255,32,1
    37,201,169,146,32,210,255,20
    8,3,32,137,2077
40  1010 DATA 201,173,29,192,208
    ,5,238,29,192,208,3,206,29,1
    92,200,192,2297
6D  1020 DATA 16,208,203,165,251
    ,24,105,16,176,5,133,251,76,
    210,197,169,2205
5A  1030 DATA 0,141,29,192,96,17
    3,22,192,41,240,72,74,74,74,
    74,168,1662
74  1040 DATA 248,24,104,240,6,1
    05,6,136,76,51,198,72,41,240
    ,74,74,1695
04  1050 DATA 74,74,9,48,141,24,
    192,173,22,192,41,15,201,10,
    48,6,1270
81  1060 DATA 238,24,192,56,233,
    10,9,48,141,25,192,24,104,41
    ,15,248,1600
3B  1070 DATA 109,25,192,141,25,
    192,216,173,25,192,41,240,56
    ,233,48,240,2148
21  1080 DATA 13,238,24,192,173,
    25,192,41,63,9,48,141,25,192
    ,96,169,1641
E2  1090 DATA 45,133,251,169,4,1
    33,252,32,216,202,160,0,162,
    34,177,251,2221
02  1100 DATA 141,22,192,32,206,
    198,32,210,255,200,192,34,24
    0,10,152,41,2157
4E  1110 DATA 1,208,5,169,59,32,
    210,255,202,208,227,169,13,3
    2,210,255,2255
42  1120 DATA 24,169,40,101,251,
    133,251,144,2,230,252,160,0,
    162,34,165,2118
1D  1130 DATA 251,201,213,208,20
    1,32,174,255,169,50,32,195,2
    55,96,201,128,2661
FB  1140 DATA 48,3,56,233,128,20
    1,32,16,3,24,105,64,96,173,3
    0,192,1404
6B  1150 DATA 240,8,169,0,141,30
    ,192,76,192,197,173,27,192,1
    33,251,173,2194
46  1160 DATA 28,192,133,252,169
    ,87,133,253,169,4,133,254,16
    0,0,177,251,2395
61  1170 DATA 201,63,48,7,201,91
    ,16,3,56,233,64,141,22,192,1
    69,32,1539
5F  1180 DATA 145,253,230,253,20
    8,2,230,254,173,22,192,145,2
    53,200,192,16,2768
FD  1190 DATA 208,220,160,0,24,1
    69,24,101,253,133,253,144,2,
    230,254,24,2199
EE  1200 DATA 165,251,105,16,133
    ,251,208,198,169,1,141,30,19
    2,96,201,32,2189
FA  1210 DATA 48,6,201,96,16,2,2
    4,96,56,96,72,138,56,233,2,1
    70,1312
6F  1220 DATA 152,56,233,7,168,1
    04,201,48,48,88,201,71,16,84
    ,201,65,1743
62  1230 DATA 48,3,56,233,7,56,2
    33,48,72,152,41,1,208,25,104
    ,10,1297
34  1240 DATA 10,10,10,72,32,155
    ,199,185,0,207,41,15,153,0,2
    07,104,1400
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C1   1250 DATA 25,0,207,153,0,207
     ,96,32,155,199,136,185,0,207
     ,41,240,1883
D5   1260 DATA 153,0,207,104,25,0
     ,207,153,0,207,96,138,202,48
     ,5,24,1569
81   1270 DATA 105,15,208,248,141
     ,22,192,152,24,105,1,74,24,1
     09,22,192,1634
1E   1280 DATA 168,96,169,157,32,
     210,255,169,63,32,210,255,16
     9,157,32,210,2384
AE   1290 DATA 255,96,56,32,240,2
     55,224,2,16,6,189,17,32,210,
     255,96,1961
4D   1300 DATA 224,18,48,8,169,14
     5,32,210,255,76,242,199,192,
     7,16,18,1859
D2   1310 DATA 192,5,48,35,169,29
     ,32,210,255,174,30,192,240,3
     ,32,210,1856
4E   1320 DATA 255,96,192,39,48,1
     3,169,157,32,210,255,174,30,
     192,240,241,2343
7A   1330 DATA 32,210,255,192,6,1
     6,7,160,38,202,24,32,240,255
     ,96,72,1837
96   1340 DATA 138,56,233,2,170,1
     52,56,233,7,168,32,155,199,1
     04,136,153,1994
78   1350 DATA 0,207,96,201,17,20
     8,6,169,157,32,210,255,96,20
     1,145,240,2240
F9   1360 DATA 246,201,157,208,24
     7,32,39,200,76,39,200,173,27
     ,192,133,179,2349
83   1370 DATA 174,28,192,202,134
     ,180,169,49,141,17,193,96,16
     2,8,165,247,2157
64   1380 DATA 133,250,165,248,6,
     250,42,197,249,144,4,229,249
     ,230,250,202,2848
E5   1390 DATA 208,242,96,173,24,
     192,10,10,10,10,133,247,173,
     25,192,41,1786
3E   1400 DATA 15,5,247,133,247,1
     69,0,133,248,169,22,133,249,
     248,32,76,2126
10   1410 DATA 200,216,201,10,48,
     3,24,105,1,105,48,141,25,192
     ,165,250,1734
83   1420 DATA 9,48,141,24,192,96
     ,32,231,255,169,5,160,162,8,
     32,186,1758
7D   1430 DATA 255,169,1,162,18,1
     60,192,32,189,255,32,192,255
     ,169,15,160,2264
E3   1440 DATA 162,8,32,186,255,1
     69,0,32,189,255,32,192,255,9
     6,162,19,2044
5C   1450 DATA 160,4,24,32,240,25
     5,160,0,169,28,32,210,255,18
     5,252,192,2198
28   1460 DATA 32,210,255,200,185
     ,252,192,32,210,255,162,32,1
     34,178,162,0,2491
C3   1470 DATA 165,198,208,23,202
     ,208,249,198,178,208,245,169
     ,32,32,210,255,2780
24   1480 DATA 166,198,208,7,200,
     192,20,208,212,240,195,169,3
     2,32,210,255,2544
C3   1490 DATA 173,119,2,201,137,
     208,6,169,151,32,210,255,96,
     169,151,32,2111
52   1500 DATA 210,255,104,104,76
     ,85,193,32,150,200,162,15,32
     ,201,255,160,2234
0E   1510 DATA 0,185,31,193,32,21
     0,255,200,192,10,208,245,32,
     204,255,96,2348
93   1520 DATA 32,150,200,162,5,3
     2,201,255,173,27,192,133,251
     ,173,28,192,2206
```

```
49   1530 DATA 133,252,160,1,177,
     251,32,210,255,200,192,1,208
     ,246,32,204,2554
69   1540 DATA 255,169,50,141,17,
     193,162,15,32,201,255,160,0,
     185,16,193,2044
39   1550 DATA 32,210,255,200,192
     ,15,208,245,32,204,255,169,5
     ,32,195,255,2504
A5   1560 DATA 169,15,32,195,255,
     32,231,255,96,173,30,192,240
     ,6,206,30,2157
05   1570 DATA 192,32,221,198,96,
     24,32,240,255,173,24,192,32,
     210,255,173,2349
AC   1580 DATA 25,192,32,210,255,
     96,162,19,160,4,24,32,240,25
     5,160,0,1866
09   1590 DATA 185,41,193,32,210,
     255,200,192,20,208,245,32,22
     8,255,240,251,2787
01   1600 DATA 201,80,208,5,32,19
     4,201,56,96,201,83,208,238,3
     2,194,201,2230
CA   1610 DATA 24,96,166,214,160,
     39,24,32,240,255,169,20,160,
     39,32,210,1880
EF   1620 DATA 255,136,208,250,96
     ,169,147,32,210,255,169,0,13
     3,176,133,177,2546
27   1630 DATA 170,168,24,32,240,
     255,32,181,202,169,13,32,210
     ,255,230,176,2389
9D   1640 DATA 166,176,164,177,24
     ,32,240,255,32,122,197,173,0
     ,207,141,23,2129
24   1650 DATA 192,32,206,202,176
     ,55,173,1,207,141,26,192,32,
     181,202,32,2050
AA   1660 DATA 0,197,169,13,32,21
     0,255,230,176,165,176,201,24
     ,240,3,76,2167
82   1670 DATA 240,201,169,0,133,
     176,24,165,177,105,5,133,177
     ,201,40,208,2154
04   1680 DATA 9,169,147,32,210,2
     55,169,0,133,177,76,240,201,
     32,228,255,2339
08   1690 DATA 240,251,32,251,195
     ,32,192,197,76,85,193,238,19
     ,192,169,0,2362
28   1700 DATA 141,33,192,32,216,
     202,32,181,202,169,32,32,210
     ,255,238,33,2200
C5   1710 DATA 192,32,122,197,173
     ,0,207,141,23,192,32,206,202
     ,176,43,173,2111
45   1720 DATA 1,207,141,26,192,3
     2,216,202,32,181,202,169,32,
     32,210,255,2130
BC   1730 DATA 238,33,192,173,33,
     192,201,15,48,10,169,0,141,3
     3,192,169,1839
16   1740 DATA 13,32,210,255,32,0
     ,197,76,97,202,32,216,202,16
     9,13,32,1778
22   1750 DATA 210,255,169,0,32,2
     10,255,32,174,255,169,50,32,
     195,255,206,2499
A4   1760 DATA 19,192,76,85,193,1
     73,23,192,141,22,192,32,43,1
     97,32,137,1749
66   1770 DATA 201,173,26,192,141
     ,22,192,32,43,197,32,137,201
     ,96,240,6,1931
EF   1780 DATA 201,37,16,2,24,96,
     56,96,169,50,162,4,160,255,3
     2,186,1546
F7   1790 DATA 255,169,0,32,189,2
     55,32,192,255,162,50,32,201,
     255,96,255,2430
5C   1800 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
```

DIR EDITOR

```
PROGRAM:DIR EDITOR

03   10 BL=153:LN=50:SA=2049
61   20 FORL=0TOBL:CX=0:FORD=0TO1
     5:READA:CX=CX+A:POKESA+L*16+
     D,A:POKES3280,A:NEXTD
A5   30 READ A:IF A><CX THENPRINT
     "ERROR IN LINE";LN+(L*10):ST
     OP
F6   40 NEXTL
B7   43 POKE43,1:POKE44,8:POKE45,
     153:POKE46,17:SAVE"DIR EDITO
     R.",DEVICE
44   45 REM CHANGE 'DEVICE' TO 1
     FOR CASSETTE OR 8 FOR DISK
03   50 DATA 22,8,195,7,158,50,48
     ,56,48,58,143,34,20,20,20,20
     ,907
91   60 DATA 82,65,84,84,0,0,0,0,
     0,0,0,0,0,0,0,162,477
E8   70 DATA 0,189,115,8,157,0,1,
     232,224,151,208,245,162,0,18
     9,14,1895
E7   80 DATA 9,157,0,2,232,224,84
     ,208,245,169,62,133,252,169,
     3,133,2082
88   90 DATA 253,173,10,9,133,250
     ,173,11,9,133,251,173,12,9,1
     33,248,1980
F6   100 DATA 173,13,9,133,249,16
     5,248,56,229,250,133,254,165
     ,249,229,251,2806
CF   110 DATA 133,255,165,254,24,
     105,61,133,254,165,255,105,3
     ,133,255,76,2376
C2   120 DATA 0,1,120,169,0,141,1
     7,208,133,1,160,0,177,250,14
     5,252,1774
CE   130 DATA 230,250,208,2,230,2
     51,230,252,208,2,230,253,165
     ,251,197,249,3208
36   140 DATA 144,234,208,6,165,2
     50,197,248,144,226,162,0,189
     ,0,2,24,2199
F6   150 DATA 125,2,2,133,250,189
     ,1,2,125,3,2,133,251,165,250
     ,56,1689
F5   160 DATA 233,1,133,250,165,2
     51,233,0,133,251,189,2,2,133
     ,252,189,2417
01   170 DATA 3,2,133,253,160,0,1
     77,254,145,250,165,254,56,23
     3,1,133,2219
78   180 DATA 254,165,255,233,0,1
     33,255,165,250,56,233,1,133,
     250,165,251,2799
D0   190 DATA 233,0,133,251,165,2
     52,56,233,1,133,252,165,253,
     233,0,133,2493
AD   200 DATA 253,5,252,208,209,1
     38,56,233,4,170,16,160,169,1
     19,133,1,2126
9E   210 DATA 88,169,27,141,17,20
     8,76,0,64,20,9,153,17,0,64,1
     33,1186
F6   220 DATA 8,0,0,160,0,185,150
     ,71,32,210,255,200,192,40,14
     4,245,1892
AD   230 DATA 32,228,255,201,32,2
     08,249,32,92,67,169,255,141,
     138,2,169,2270
76   240 DATA 0,141,32,208,141,33
     ,208,141,0,9,141,1,9,32,104,
     64,1264
CE   250 DATA 169,147,32,210,255,
     169,4,162,0,157,0,216,157,25
     0,216,157,2301
F2   260 DATA 244,217,157,238,218
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    ,232,208,241,32,138,70,32,71
    ,71,169,0,2338
98  270 DATA 141,137,66,141,138,
    66,141,191,68,169,3,141,199,
    69,32,134,1836
3D  280 DATA 65,32,223,66,32,200
    ,69,76,91,64,96,169,0,133,25
    0,169,1735
06  290 DATA 16,133,251,162,18,1
    60,0,142,42,65,140,43,65,32,
    239,64,1572
F9  300 DATA 173,0,8,141,42,65,1
    73,1,8,141,43,65,32,120,65,3
    2,1109
4F  310 DATA 239,64,162,0,160,0,
    142,119,65,185,2,8,145,250,2
    00,202,1943
6C  320 DATA 208,247,173,0,8,240
    ,12,230,251,165,251,201,32,1
    44,209,238,2609
AC  330 DATA 32,208,96,76,140,66
    ,169,1,162,41,160,65,32,189,
    255,169,1861
A2  340 DATA 5,162,8,160,5,32,18
    6,255,32,192,255,169,15,162,
    24,160,1822
51  350 DATA 65,32,189,255,169,1
    5,168,162,8,32,186,255,76,19
    2,255,162,2221
EA  360 DATA 15,32,201,255,160,0
    ,185,24,65,32,210,255,200,19
    2,15,144,1985
32  370 DATA 245,96,169,49,141,2
    5,65,32,84,65,32,179,64,162,
    5,32,1445
F9  380 DATA 198,255,160,0,32,20
    7,255,153,0,8,200,208,247,32
    ,204,255,2414
84  390 DATA 169,15,32,195,255,1
    69,5,32,195,255,96,85,49,58,
    32,48,1690
88  400 DATA 53,32,48,48,32,48,4
    8,32,48,48,13,0,35,0,0,48,53
    3
8E  410 DATA 48,48,49,48,50,48,5
    1,48,52,48,53,48,54,48,55,48
    ,796
AC  420 DATA 56,48,57,49,48,49,4
    9,49,50,49,51,49,52,49,53,49
    ,807
5E  430 DATA 54,49,55,49,56,49,5
    7,173,42,65,10,170,189,44,65
    ,141,1268
4F  440 DATA 34,65,189,45,65,141
    ,35,65,173,43,65,10,170,189,
    44,65,1398
F5  450 DATA 141,37,65,189,45,65
    ,141,38,65,96,0,160,0,185,34
    ,65,1326
E2  460 DATA 32,210,255,200,192,
    6,144,245,96,169,0,133,252,1
    69,16,133,2252
A8  470 DATA 253,169,85,141,0,4,
    160,1,169,64,153,0,4,200,192
    ,19,1614
1C  480 DATA 144,248,169,73,141,
    19,4,174,137,66,240,14,165,2
    52,24,105,1975
D1  490 DATA 32,133,252,144,2,23
    0,253,202,208,242,169,39,133
    ,254,169,4,2466
2C  500 DATA 133,255,169,39,133,
    250,169,216,133,251,169,0,14
    1,135,66,173,2432
DE  510 DATA 137,66,141,136,66,1
    60,1,169,93,145,254,200,169,
    34,32,170,1973
92  520 DATA 67,145,254,32,85,70
    ,169,0,141,190,68,200,177,25
    2,32,170,2052
62  530 DATA 67,145,254,32,85,70
    ,200,192,19,144,241,173,190,
    68,240,3,2123
28  540 DATA 169,32,44,169,34,32
    ,170,67,145,254,32,85,70,200
    ,169,93,1765
62  550 DATA 145,254,165,252,24,
    105,32,133,252,144,2,230,253
    ,165,250,24,2430
16  560 DATA 105,40,133,250,144,
    2,230,251,165,254,24,105,40,
    133,254,144,2274
30  570 DATA 2,230,255,238,136,6
    6,238,135,66,173,136,66,205,
    139,66,176,2327
4A  580 DATA 7,173,135,66,201,20
    ,144,141,160,1,169,93,145,25
    4,200,169,2078
C2  590 DATA 32,32,170,67,145,25
    4,200,192,20,144,244,169,93,
    145,254,165,2326
A2  600 DATA 254,24,105,40,133,2
    54,144,2,230,255,160,1,169,7
    4,145,254,2244
09  610 DATA 200,169,64,145,254,
    192,19,144,247,200,169,75,14
    5,254,169,32,2478
56  620 DATA 160,41,145,254,200,
    192,61,144,249,96,0,0,0,0,17
    ,169,1728
1C  630 DATA 0,133,250,169,16,13
    3,251,169,0,141,139,66,160,0
    ,152,17,1796
92  640 DATA 250,200,192,32,144,
    249,201,0,240,17,238,139,66,
    165,250,24,2407
44  650 DATA 105,32,133,250,144,
    230,230,251,76,153,66,96,3,1
    7,145,148,2079
6D  660 DATA 20,32,13,133,136,42
    ,76,83,255,255,12,67,49,67,2
    0,67,1327
EF  670 DATA 198,67,84,68,210,68
    ,77,70,185,69,163,70,193,68,
    118,71,1779
54  680 DATA 191,71,32,228,255,1
    41,198,66,162,0,142,183,69,1
    89,185,66,2178
DD  690 DATA 205,198,66,240,8,20
    1,255,240,3,232,208,241,96,1
    38,10,170,2511
2C  700 DATA 189,199,66,141,10,6
    7,189,200,66,141,11,67,76,25
    5,255,169,2101
39  710 DATA 1,32,105,69,104,104
    ,96,173,138,66,240,23,56,233
    ,1,205,1646
2E  720 DATA 137,66,144,4,206,13
    8,66,96,173,137,66,240,6,206
    ,137,66,1888
21  730 DATA 206,138,66,96,173,1
    38,66,205,139,66,240,247,24,
    105,1,205,2115
64  740 DATA 136,66,176,4,238,13
    8,66,96,238,138,66,173,139,6
    6,56,233,2029
30  750 DATA 20,144,224,56,237,1
    37,66,144,218,240,216,238,13
    7,66,96,169,2408
46  760 DATA 0,133,250,169,16,13
    3,251,169,0,162,23,160,0,145
    ,250,200,2061
42  770 DATA 208,251,230,251,202
    ,16,246,96,201,160,208,17,17
    3,190,68,208,2725
56  780 DATA 6,169,34,238,190,68
    ,96,169,32,96,169,64,96,201,
    64,144,1836
18  790 DATA 9,201,96,240,245,17
    6,11,41,63,96,201,32,144,1,9
    6,9,1661
25  800 DATA 128,96,201,192,144,
    3,41,127,96,56,233,64,96,32,
    117,67,1693
80  810 DATA 72,173,138,66,205,1
    36,66,240,2,104,96,173,184,6
    9,240,5,1969
83  820 DATA 204,199,69,208,244,
    104,73,128,96,173,139,66,201
    ,144,240,248,2536
F0  830 DATA 173,139,66,32,46,68
    ,174,139,66,232,236,138,66,2
    40,36,160,2011
4F  840 DATA 0,177,250,145,252,2
    00,192,32,144,247,165,250,56
    ,233,32,133,2508
4D  850 DATA 250,176,2,198,251,1
    65,252,56,233,32,133,252,176
    ,2,198,253,2629
63  860 DATA 202,208,215,238,139
    ,66,160,32,169,128,145,250,2
    00,169,18,145,2484
A9  870 DATA 250,200,169,0,145,2
    50,169,32,162,0,200,145,250,
    232,224,17,2445
2F  880 DATA 144,248,169,0,145,2
    50,200,192,64,144,247,32,49,
    67,76,20,2047
E0  890 DATA 67,133,250,169,0,6,
    250,42,6,250,42,6,250,42,6,2
    50,1769
37  900 DATA 42,6,250,42,24,105,
    16,133,251,165,250,24,105,32
    ,133,252,1830
CF  910 DATA 165,251,105,0,133,2
    53,96,173,184,69,208,250,173
    ,138,66,205,2469
3B  920 DATA 139,66,240,242,173,
    138,66,32,46,68,173,183,69,2
    08,13,160,2016
1B  930 DATA 0,177,250,201,128,2
    40,5,169,0,32,105,69,174,138
    ,66,236,1990
78  940 DATA 139,66,240,38,160,0
    ,177,252,145,250,200,192,32,
    144,247,165,2447
28  950 DATA 250,24,105,32,133,2
    50,165,251,144,2,230,251,165
    ,252,24,105,2303
25  960 DATA 32,133,252,144,2,23
    0,253,232,208,213,206,139,66
    ,173,136,66,2485
62  970 DATA 56,233,1,205,139,66
    ,208,8,173,137,66,240,3,206,
    137,66,1944
58  980 DATA 96,0,0,96,173,73,69
    ,201,234,240,248,173,73,69,2
    01,128,2074
76  990 DATA 208,241,76,30,69,17
    3,184,69,208,233,173,191,68,
    208,88,173,2392
A0  1000 DATA 138,66,205,139,66,
    240,220,238,183,69,32,46,68,
    160,0,140,2010
28  1010 DATA 190,68,177,250,153
    ,73,69,200,192,32,144,246,16
    9,34,141,61,2199
9C  1020 DATA 4,160,3,185,73,69,
    32,170,67,153,59,4,200,192,1
    9,144,1534
D7  1030 DATA 242,173,190,68,208
    ,5,169,34,141,78,4,238,191,6
    8,76,84,1969
89  1040 DATA 68,32,198,67,173,1
    38,66,32,46,68,160,0,185,73,
    69,145,1520
36  1050 DATA 250,200,192,32,144
    ,246,96,32,30,69,160,1,169,3
    2,153,59,1865
4D  1060 DATA 4,200,192,20,144,2
    48,169,0,141,191,68,96,234,2
    34,234,234,2409
F1  1070 DATA 234,234,234,234,23
    4,234,234,234,234,234,234,23
    4,234,234,234,234,3744
46  1080 DATA 234,234,234,234,23
    4,234,234,234,234,234,234,23
    4,10,10,168,142,3138
97  1090 DATA 126,69,162,0,185,1
    34,71,157,166,69,232,200,224
    ,4,144,244,2187
82  1100 DATA 162,0,160,0,185,16
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      6,69,41,63,153,101,4,200,192
      ,17,144,1657
98    1110 DATA 243,32,228,255,240
      ,251,201,89,240,2,104,104,16
      0,0,169,32,2350
81    1120 DATA 153,101,4,200,192,
      17,144,248,96,63,63,63,63,32
      ,83,85,1607
82    1130 DATA 82,69,32,40,89,47,
      78,41,32,63,0,0,173,191,68,2
      08,1213
AD    1140 DATA 8,173,184,69,73,1,
      141,184,69,96,3,173,184,69,2
      08,1,1636
BA    1150 DATA 96,173,138,66,205,
      139,66,240,247,173,198,66,24
      0,242,201,13,2503
72    1160 DATA 240,238,201,3,240,
      234,201,148,240,230,201,17,2
      40,226,201,145,3005
89    1170 DATA 240,222,201,133,24
      0,218,201,20,240,16,201,136,
      240,210,201,34,2753
9C    1180 DATA 240,19,201,29,240,
      23,201,157,208,30,173,199,69
      ,201,3,240,2233
14    1190 DATA 191,206,199,69,96,
      169,160,141,198,66,76,37,70,
      173,199,69,2119
60    1200 DATA 201,18,240,172,238
      ,199,69,96,173,138,66,32,46,
      68,173,137,2066
67    1210 DATA 70,208,18,160,0,17
      7,250,201,128,240,10,238,32,
      208,32,134,2106
72    1220 DATA 65,206,32,208,96,1
      72,199,69,173,198,66,145,250
      ,76,26,70,2051
D2    1230 DATA 169,3,141,199,69,7
      6,49,67,140,98,70,173,137,70
      ,208,9,1678
34    1240 DATA 160,0,177,252,160,
      0,24,105,1,145,250,96,69,68,
      73,84,1664
19    1250 DATA 32,68,69,76,32,70,
      73,76,69,83,32,32,69,68,73,8
      4,1006
6F    1260 DATA 32,65,76,76,32,70,
      73,76,69,83,32,32,0,173,137,
      70,1096
0C    1270 DATA 10,10,10,10,168,16
      2,0,185,105,70,41,63,157,192
      ,7,232,1422
73    1280 DATA 200,224,16,144,242
      ,96,173,137,70,73,1,141,137,
      70,76,138,1938
25    1290 DATA 70,40,67,41,32,49,
      57,56,56,32,82,65,84,84,0,0,
      815
23    1300 DATA 67,82,83,82,32,61,
      32,77,79,86,69,0,70,49,32,61
      ,962
50    1310 DATA 32,69,68,73,84,32,
      77,79,68,69,0,70,55,32,61,32
      ,901
F6    1320 DATA 69,68,73,84,32,84,
      89,80,69,0,0,83,80,65,67,69,
      1012
34    1330 DATA 32,61,32,71,82,65,
      66,0,65,71,65,73,78,32,61,32
      ,886
20    1340 DATA 80,85,84,0,32,32,3
      2,32,42,32,61,32,67,79,80,89
      ,859
CD    1350 DATA 32,71,82,65,66,0,0
      ,76,32,61,32,76,79,65,68,0,8
      05
2A    1360 DATA 83,32,61,32,83,65,
      86,69,32,68,73,82,0,0,73,78,
      917
FB    1370 DATA 83,84,32,61,32,73,
      78,83,84,69,82,84,0,68,69,76
      ,1058
4F    1380 DATA 32,61,32,68,69,76,
      69,84,69,255,169,221,133,250
      ,169,4,1761
CF    1390 DATA 133,251,162,0,160,
      0,189,174,70,240,13,201,255,
      240,8,41,2137
E5    1400 DATA 63,145,250,200,232
      ,208,239,96,160,0,165,250,24
      ,105,40,133,2310
6E    1410 DATA 250,144,2,230,251,
      232,76,83,71,173,184,69,208,
      10,169,2,2154
FA    1420 DATA 32,105,69,104,104,
      76,0,64,96,32,68,69,76,81,85
      ,73,1134
8B    1430 DATA 84,76,79,65,68,83,
      65,86,69,147,13,13,13,13,32,
      32,938
6D    1440 DATA 32,32,32,73,78,83,
      69,82,84,32,68,73,83,75,32,6
      5,993
0F    1450 DATA 78,68,32,80,82,69,
      83,83,32,83,80,65,67,69,13,1
      3,997
88    1460 DATA 13,96,173,184,69,2
      08,250,169,3,32,105,69,169,0
      ,133,250,1923
48    1470 DATA 169,16,133,251,169
      ,0,141,103,72,173,139,66,141
      ,102,72,162,1909
24    1480 DATA 18,160,0,142,42,65
      ,140,43,65,32,239,64,173,1,8
      ,141,1333
B5    1490 DATA 43,65,32,13,72,238
      ,1,8,173,103,72,240,10,169,0
      ,141,1380
01    1500 DATA 0,8,169,255,141,1,
      8,32,48,72,173,0,8,208,221,9
      6,1440
DD    1510 DATA 162,2,160,0,177,25
      0,157,0,8,200,232,208,247,23
      0,251,173,2457
47    1520 DATA 102,72,56,233,8,14
      1,102,72,176,4,238,103,72,96
      ,201,0,1676
BC    1530 DATA 240,248,96,169,50,
      141,25,65,32,84,65,169,1,162
      ,41,160,1748
24    1540 DATA 65,32,189,255,169,
      5,162,8,160,5,32,186,255,32,
      192,255,2002
E8    1550 DATA 32,112,72,162,5,32
      ,201,255,160,0,185,0,8,32,21
      0,255,1721
FD    1560 DATA 200,208,247,32,220
      ,64,76,10,65,0,0,66,45,80,58
      ,32,1403
6E    1570 DATA 53,32,48,169,8,162
      ,104,160,72,32,189,255,169,1
      5,162,8,1638
D1    1580 DATA 160,15,32,186,255,
      76,192,0,0,0,0,0,0,0,0,0,916
```

EASY BASIC

EASY BASIC

PROGRAM: LOADER

```
9E    10 BL=13:LN=50:SA=2049
61    20 FORL=0TOBL:CX=0:FORD=0TO1
      5:READA:CX=CX+A:POKESA+L*16+
      D,A:POKE53280,A:NEXTD
B5    30 READA:IFA><CXTHENPRINT"ER
      ROR IN LINE";LN+(L*10):STOP
F6    40 NEXTL
AB    43 POKE43,1:POKE44,8:POKE45,
      216:POKE46,8:SAVE"EB LOADER"
      ,DEVICE
44    45 REM CHANGE 'DEVICE' TO 1
      FOR CASSETTE OR 8 FOR DISK
60    50 DATA 25,8,10,0,143,32,69,
      65,83,89,32,66,65,83,73,67,9
      10
C8    60 DATA 32,76,79,65,68,69,82
      ,0,52,8,20,0,153,34,68,73,87
      9
0A    70 DATA 83,75,32,79,82,32,84
      ,65,80,69,63,32,40,68,47,84,
      1015
21    80 DATA 41,34,0,70,8,30,0,16
      1,75,36,58,139,75,36,178,34,
      975
09    90 DATA 34,167,51,48,0,89,8,
      40,0,139,75,36,179,177,34,84
      ,1161
EB    100 DATA 34,167,158,50,49,54
      ,57,0,107,8,50,0,151,50,50,4
      8,1033
13    110 DATA 49,44,49,58,158,50,
      49,54,57,0,0,0,255,162,0,189
      ,1174
F8    120 DATA 206,8,32,210,255,20
      2,16,247,162,6,160,0,132,157
      ,142,32,1967
C1    130 DATA 208,142,33,208,169,
      1,153,0,216,153,0,217,153,0,
      218,153,2024
CF    140 DATA 0,219,200,208,241,1
      69,1,162,8,160,255,32,186,25
      5,169,15,2280
24    150 DATA 162,191,160,8,32,18
      9,255,169,0,133,10,32,213,25
      5,32,83,1924
57    160 DATA 228,169,128,133,157
      ,32,68,229,32,68,166,76,137,
      205,69,65,1962
7F    170 DATA 83,89,32,66,65,83,7
      3,67,32,86,49,46,49,32,32,32
      ,916
23    180 DATA 32,32,32,145,0,0,0,
      0,0,0,0,0,0,0,0,0,241
```

PROGRAM:CODE

```
D2    10 BL=607:LN=50:SA=43520
10    20 FORL=0TOBL:CX=0:FORD=0TO1
      5:READA:CX=CX+A:POKESA+L*16+
      D,A:POKE53280,0:NEXTD
B5    30 READA:IFA><CXTHENPRINT"ER
      ROR IN LINE";LN+(L*10):STOP
40    40 NEXT L:END
ED    50 DATA 13,32,32,32,32,60,60
      ,60,60,60,32,69,65,83,89,32,
      811
B0    60 DATA 66,65,83,73,67,32,67
      ,79,77,77,65,78,68,83,32,62,
      1074
93    70 DATA 62,62,62,62,13,13,0,
      32,60,70,73,78,68,62,83,84,8
      84
AB    80 DATA 82,73,78,71,13,13,32
      ,32,32,32,76,73,83,84,83,32,
      889
95    90 DATA 76,73,78,69,83,32,67
      ,79,78,84,65,73,78,73,78,71,
      1157
67    100 DATA 32,83,84,82,73,78,7
      1,46,13,13,32,60,82,69,78,62
      ,958
28    110 DATA 83,84,65,82,84,44,8
      3,84,68,80,13,13,32,32,32,32
      ,912
3C    120 DATA 82,69,78,85,77,66,6
      9,82,83,32,66,65,83,73,67,32
      ,1109
```

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E0  130 DATA 80,82,79,71,82,65,7
    7,46,13,13,32,60,65,85,84,79
    ,1013
11  140 DATA 62,83,84,65,82,84,4
    4,83,84,69,80,13,13,32,32,32
    ,942
92  150 DATA 32,71,73,86,69,83,3
    2,65,85,84,79,77,65,84,73,67
    ,1125
E4  160 DATA 32,76,73,78,69,32,7
    8,85,77,66,69,82,83,46,13,13
    ,972
98  170 DATA 32,60,68,69,76,62,7
    6,73,78,69,49,44,76,73,78,69
    ,1052
17  180 DATA 50,13,13,32,32,32,3
    2,68,69,76,69,84,69,83,32,70
    ,824
DC  190 DATA 82,79,77,32,76,73,7
    8,69,49,32,84,79,32,76,73,78
    ,1069
88  200 DATA 69,50,46,13,13,32,6
    0,79,76,68,62,32,32,13,13,32
    ,690
C6  210 DATA 32,32,32,82,69,67,7
    9,86,69,82,83,32,80,82,79,71
    ,1057
28  220 DATA 82,65,77,32,65,70,8
    4,69,82,32,39,78,69,87,39,46
    ,1016
89  230 DATA 13,13,0,32,60,87,72
    ,89,62,13,13,32,32,32,32,76,
    658
F8  240 DATA 73,83,84,83,32,76,7
    3,78,69,32,65,70,84,69,82,32
    ,1085
03  250 DATA 69,82,82,79,82,47,6
    6,82,69,65,75,46,13,13,32,60
    ,962
11  260 DATA 86,65,82,62,13,13,3
    2,32,32,32,68,85,77,80,83,32
    ,874
74  270 DATA 86,65,76,85,69,83,3
    2,79,70,32,65,76,76,32,86,65
    ,1077
AA  280 DATA 82,73,65,66,76,69,8
    3,46,13,13,32,60,64,62,13,13
    ,830
63  290 DATA 32,32,32,32,76,73,8
    3,84,32,67,85,82,82,69,78,84
    ,1023
5D  300 DATA 32,66,65,83,73,67,3
    2,80,82,79,71,82,65,77,46,13
    ,1013
A0  310 DATA 13,32,60,75,73,76,7
    6,62,13,13,32,32,32,32,78,79
    ,778
A9  320 DATA 82,77,65,76,32,66,6
    5,83,73,67,45,82,47,83,84,79
    ,1106
1E  330 DATA 80,32,82,46,82,69,8
    4,85,82,78,83,46,13,13,32,60
    ,967
AE  340 DATA 83,87,73,84,67,72,6
    2,13,13,32,32,32,32,84,79,71
    ,916
9E  350 DATA 71,76,69,32,80,82,6
    9,83,69,84,32,38,32,68,69,70
    ,1024
D5  360 DATA 73,78,65,66,76,69,3
    2,70,45,75,69,89,83,46,13,13
    ,962
D5  370 DATA 0,32,60,72,84,65,66
    ,62,13,13,32,32,32,32,83,69,
    747
30  380 DATA 84,32,77,65,88,32,6
    7,85,82,83,79,82,32,77,79,86
    ,1130
46  390 DATA 69,83,32,79,78,32,7
    0,45,75,69,89,83,46,13,13,32
    ,908
C3  400 DATA 60,86,84,65,66,62,1
    3,13,32,32,32,32,83,69,84,32
    ,845
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BA  410 DATA 77,65,88,32,67,85,8
    2,83,79,82,32,77,79,86,69,83
    ,1166
31  420 DATA 45,32,86,69,82,84,7
    3,67,65,76,46,13,13,32,60,75
    ,918
94  430 DATA 69,89,70,62,13,13,3
    2,32,32,32,76,73,83,84,32,68
    ,860
2D  440 DATA 69,70,73,78,65,66,7
    6,69,32,70,45,75,69,89,83,32
    ,1061
E3  450 DATA 67,79,78,84,69,78,8
    4,83,46,13,13,32,60,75,69,89
    ,1019
19  460 DATA 70,62,78,79,46,34,8
    3,84,82,73,78,71,13,13,32,32
    ,930
B3  470 DATA 32,32,68,69,70,73,7
    8,69,32,70,45,75,69,89,32,78
    ,981
B1  480 DATA 79,32,87,73,84,72,3
    2,83,84,82,73,78,71,46,13,13
    ,1002
3B  490 DATA 32,60,76,73,66,62,1
    3,13,32,32,32,32,76,73,83,84
    ,839
F5  500 DATA 32,83,85,66,82,79,8
    5,84,73,78,69,32,76,73,66,82
    ,1145
75  510 DATA 65,82,89,32,70,73,7
    6,69,83,46,13,13,0,32,60,76,
    879
DB  520 DATA 73,66,70,62,34,70,7
    3,76,69,78,65,77,69,34,44,76
    ,1036
56  530 DATA 49,44,76,50,13,13,3
    2,32,32,32,80,85,84,32,70,73
    ,797
E9  540 DATA 76,69,32,73,78,32,8
    3,85,66,82,79,85,84,73,78,69
    ,1144
D4  550 DATA 32,76,73,66,82,65,8
    2,89,46,13,13,32,60,76,73,66
    ,944
1C  560 DATA 68,62,13,13,32,32,3
    2,32,68,69,76,69,84,69,32,70
    ,821
6E  570 DATA 73,76,69,32,73,78,3
    2,83,85,66,82,79,85,84,73,78
    ,1148
F0  580 DATA 69,32,76,73,66,82,6
    5,82,89,46,13,13,32,60,76,73
    ,947
2F  590 DATA 66,83,62,32,32,32,3
    2,32,32,32,32,32,13,13,32,32
    ,589
88  600 DATA 32,32,83,65,86,69,3
    2,67,85,82,82,69,78,84,32,83
    ,1061 -
86  610 DATA 85,66,82,79,85,84,7
    3,78,69,32,76,73,66,82,65,82
    ,1177
CC  620 DATA 89,46,13,13,32,60,7
    6,73,66,76,62,34,70,73,76,69
    ,928
34  630 DATA 78,65,77,69,13,13,3
    2,32,32,32,76,79,65,68,32,65
    ,828
62  640 DATA 32,83,85,66,82,79,8
    5,84,73,78,69,32,76,73,66,82
    ,1145
C3  650 DATA 65,82,89,32,70,73,7
    6,69,46,13,13,32,60,67,79,76
    ,942
13  660 DATA 79,85,82,62,76,73,7
    8,69,44,67,79,76,40,48,45,49
    ,1052
25  670 DATA 53,41,13,13,32,32,3
    2,32,65,68,68,32,67,79,76,79
    ,782
04  680 DATA 85,82,32,84,79,32,6
    6,65,83,73,67,32,76,73,83,84
    ,1096
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B4  690 DATA 73,78,71,46,13,13,0
    ,32,60,78,65,77,69,62,13,13,
    763
89  700 DATA 32,32,32,32,83,69,8
    4,32,84,72,69,32,67,85,82,82
    ,969
7F  710 DATA 69,78,84,32,80,82,7
    9,71,82,65,77,32,78,65,77,69
    ,1120
20  720 DATA 46,13,13,32,60,68,6
    5,84,69,62,13,13,32,32,32,32
    ,666
FE  730 DATA 83,69,84,32,84,72,6
    9,32,67,85,82,82,69,78,84,32
    ,1104
66  740 DATA 68,65,84,69,46,13,1
    3,32,60,68,69,86,73,67,69,62
    ,944
B2  750 DATA 13,13,32,32,32,32,8
    3,69,84,32,68,69,86,73,67,69
    ,854
FE  760 DATA 32,70,79,82,32,83,6
    5,86,73,78,71,32,38,32,76,79
    ,1008
62  770 DATA 65,68,73,78,71,46,1
    3,13,32,60,64,76,62,13,13,32
    ,779
A2  780 DATA 32,32,32,76,79,65,6
    8,32,65,32,66,65,83,73,67,32
    ,899
1A  790 DATA 80,82,79,71,82,65,7
    7,46,13,13,32,60,64,83,62,34
    ,943
5C  800 DATA 70,73,76,69,78,65,7
    7,69,13,13,32,32,32,32,83,65
    ,879
42  810 DATA 86,69,32,67,85,82,8
    2,69,78,84,32,66,65,83,73,67
    ,1120
57  820 DATA 32,80,82,79,71,82,6
    5,77,46,13,13,0,32,60,68,79,
    879
3A  830 DATA 83,62,34,68,73,83,7
    5,32,67,77,68,13,13,32,32,32
    ,844
4B  840 DATA 32,79,85,84,80,85,8
    4,32,78,79,82,77,65,76,32,68
    ,1118
3D  850 DATA 73,83,75,32,67,79,7
    7,77,65,78,68,83,46,13,13,32
    ,961
85  860 DATA 60,68,73,82,62,13,1
    3,32,32,32,32,82,69,65,68,32
    ,815
A7  870 DATA 68,73,83,75,32,68,7
    3,82,69,67,84,79,82,89,32,73
    ,1129
64  880 DATA 78,32,68,82,73,86,6
    9,46,13,13,32,60,65,80,80,62
    ,939
41  890 DATA 34,70,73,76,69,78,6
    5,77,69,13,13,32,32,32,32,65
    ,830
12  900 DATA 80,80,69,78,68,32,7
    0,73,76,69,32,79,78,84,79,32
    ,1079
58  910 DATA 80,82,79,71,82,65,7
    7,32,73,78,32,77,69,77,46,13
    ,1033
5E  920 DATA 13,32,60,77,69,82,6
    2,34,70,73,76,69,78,65,77,69
    ,1006
84  930 DATA 13,13,32,32,32,32,7
    7,69,82,71,69,32,70,73,76,69
    ,842
55  940 DATA 32,73,78,84,79,32,8
    0,82,79,71,82,65,77,32,73,78
    ,1097
0F  950 DATA 32,77,69,77,46,13,1
    3,32,60,66,83,65,86,69,62,13
    ,863
F9  960 DATA 13,32,32,32,32,83,6
    5,86,69,32,65,32,66,76,79,67
    ,861
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03   970 DATA 75,32,79,70,32,77,6
     9,77,79,82,89,46,13,13,0,32,
     865
4F   980 DATA 60,66,76,79,65,68,6
     2,13,13,32,32,32,32,76,79,65
     ,850
F3   990 DATA 68,32,65,32,66,76,7
     9,67,75,32,79,70,32,77,69,77
     ,996
24   1000 DATA 79,82,89,46,13,13,
     32,60,80,82,79,84,69,67,84,6
     2,1021
BA   1010 DATA 34,70,73,76,69,78,
     65,77,69,13,13,32,32,32,32,8
     3,848
89   1020 DATA 65,86,69,32,80,82,
     79,84,69,67,84,69,68,32,66,6
     5,1097
D7   1030 DATA 83,73,67,32,80,82,
     79,71,82,65,77,46,13,13,32,6
     0,955
26   1040 DATA 73,78,70,79,62,13,
     13,32,32,32,32,68,73,83,80,7
     6,896
4F   1050 DATA 65,89,83,32,66,65,
     83,73,67,32,77,69,77,79,82,8
     9,1128
59   1060 DATA 32,73,78,70,79,82,
     77,65,84,73,79,78,46,13,13,3
     2,974
55   1070 DATA 60,72,69,76,80,62,
     13,13,32,32,32,32,68,73,83,8
     0,877
67   1080 DATA 76,65,89,83,32,84,
     72,69,83,69,32,83,85,77,77,6
     5,1141
74   1090 DATA 82,89,32,80,65,71,
     69,83,46,13,13,32,60,68,85,7
     7,965
A5   1100 DATA 80,68,62,44,83,84,
     65,82,84,32,65,68,68,82,69,8
     3,1119
2F   1110 DATA 83,13,13,32,32,32,
     32,68,85,77,80,83,32,77,69,7
     7,885
9C   1120 DATA 79,82,89,32,73,78,
     32,68,69,67,46,32,38,32,65,8
     3,965
E6   1130 DATA 67,73,73,46,13,13,
     0,32,60,68,85,77,80,72,62,44
     ,865
8A   1140 DATA 83,84,65,82,84,32,
     65,68,68,82,69,83,83,13,13,3
     2,1006
E5   1150 DATA 32,32,32,68,85,77,
     80,83,32,77,69,77,79,82,89,3
     2,1026
C7   1160 DATA 73,78,32,72,69,88,
     46,32,38,32,65,83,67,73,73,4
     6,967
1F   1170 DATA 13,13,32,60,72,69,
     88,62,44,78,85,77,66,69,82,1
     3,923
ED   1180 DATA 13,32,32,32,32,67,
     79,78,86,69,82,84,83,32,72,6
     9,942
DC   1190 DATA 88,65,68,69,67,73,
     77,65,76,32,78,85,77,66,69,8
     2,1137
FC   1200 DATA 46,13,13,32,60,68,
     69,67,62,44,78,85,77,66,69,8
     2,931
88   1210 DATA 13,13,32,32,32,32,
     67,79,78,86,69,82,84,83,32,7
     8,892
88   1220 DATA 79,82,77,65,76,32,
     68,69,67,73,77,65,76,32,78,8
     5,1101
DD   1230 DATA 77,66,69,82,46,13,
     0,0,32,60,60,32,65,78,89,32,
     801
28   1240 DATA 75,69,89,32,67,79,
     78,84,73,78,85,69,83,46,82,8
     5,1174
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7A   1250 DATA 78,32,83,84,79,80,
     32,69,88,73,84,83,32,62,62,1
     3,1034
26   1260 DATA 0,169,39,133,251,1
     69,170,133,252,162,0,189,0,1
     70,240,6,2083
ED   1270 DATA 32,210,255,232,208
     ,245,160,0,177,251,240,12,32
     ,210,255,230,2749
32   1280 DATA 251,208,243,230,25
     2,76,166,177,230,251,208,2,2
     30,252,160,0,2936
59   1290 DATA 177,251,240,25,162
     ,0,189,104,177,240,6,32,210,
     255,232,208,2508
91   1300 DATA 245,32,228,255,240
     ,251,201,3,240,3,76,153,177,
     96,4,41,2245
AF   1310 DATA 0,95,0,95,0,95,33,
     127,4,78,48,31,0,95,36,111,8
     48
AA   1320 DATA 70,95,2,95,4,95,0,
     95,0,91,0,31,4,95,20,111,808

A0   1330 DATA 32,32,32,32,32,32,
     32,32,32,115,115,115,115,32,
     32,32,844
1E   1340 DATA 78,69,73,76,32,76,
     79,86,69,83,32,83,85,83,65,7
     8,1147
AE   1350 DATA 32,38,32,76,79,82,
     78,65,32,115,115,115,115,32,
     32,32,1070
D0   1360 DATA 81,85,69,69,78,83,
     82,89,67,72,69,32,82,85,76,6
     9,1188
E9   1370 DATA 32,42,32,78,77,49,
     53,54,32,32,32,32,32,32,32,3
     2,673
A6   1380 DATA 123,32,91,0,91,0,9
     1,2,91,6,27,86,91,0,91,112,9
     14
0C   1390 DATA 91,16,91,0,91,4,12
     2,32,91,4,107,64,91,16,107,5
     2,979
7F   1400 DATA 25,0,89,0,91,0,91,
     0,91,4,91,64,91,0,67;48,752
A6   1410 DATA 8,101,60,53,124,11
     7,234,53,110,100,254,177,126
     ,165,238,33,1953
CD   1420 DATA 124,181,254,161,11
     8,116,238,161,254,245,202,19
     3,238,161,110,49,2805
17   1430 DATA 126,37,250,53,126,
     53,234,36,126,33,234,177,234
     ,165,238,33,2155
A2   1440 DATA 106,181,170,181,25
     4,181,234,33,124,37,168,165,
     250,165,234,38,2521
78   1450 DATA 74,52,28,21,74,21,
     74,52,40,53,72,21,74,85,74,1
     7,832
1C   1460 DATA 126,52,74,17,90,21
     ,78,23,94,23,74,83,74,21,78,
     99,1027
38   1470 DATA 74,21,74,21,74,169
     ,1,141,134,2,169,6,141,32,20
     8,141,1408
28   1480 DATA 33,208,162,0,189,2
     26,187,240,6,32,210,255,232,
     208,245,96,2529
35   1490 DATA 169,69,133,251,169
     ,8,133,252,24,165,45,133,98,
     133,105,105,1992
DC   1500 DATA 68,133,253,133,100
     ,165,46,133,99,133,106,105,0
     ,133,254,133,1994
BA   1510 DATA 101,56,165,253,229
     ,251,133,107,133,109,165,254
     ,229,252,133,108,2678
CF   1520 DATA 133,110,230,108,23
     0,110,160,0,177,98,145,253,1
     65,107,208,6,2240
AD   1530 DATA 198,108,165,108,24
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     0,21,198,107,165,98,208,2,19
     8,99,198,98,2211
09   1540 DATA 165,253,208,2,198,
     254,198,253,76,56,179,169,69
     ,133,43,165,2421
7A   1550 DATA 100,133,45,165,101
     ,133,46,76,56,201,173,69,8,7
     3,255,141,1775
31   1560 DATA 244,179,169,0,141,
     69,8,160,0,185,201,179,153,1
     ,8,200,1897
DD   1570 DATA 192,68,208,245,169
     ,1,133,43,32,89,225,169,1,13
     3,251,169,2128
D6   1580 DATA 8,133,252,133,254,
     169,69,133,253,160,0,177,253
     ,145,251,165,2555
A0   1590 DATA 109,208,6,198,110,
     165,110,240,17,198,109,230,2
     53,208,2,230,2393
C5   1600 DATA 254,230,251,208,2,
     230,252,76,155,179,169,1,133
     ,43,165,105,2453
7F   1610 DATA 133,45,165,106,133
     ,46,76,44,201,30,8,0,0,158,5
     0,48,1243
A6   1620 DATA 56,48,58,20,20,20,
     20,20,20,20,20,69,65,83,89,3
     2,660
F3   1630 DATA 66,65,83,73,67,0,0
     ,0,169,234,141,40,3,169,69,1
     33,1312
6E   1640 DATA 43,160,0,169,0,73,
     255,145,43,169,65,141,6,3,16
     9,8,1449
02   1650 DATA 141,7,3,32,89,166,
     76,174,167,108,0,160,0,170,1
     81,251,1725
EA   1660 DATA 226,234,161,250,23
     5,238,169,250,161,138,227,17
     0,235,238,235,165,3332
77   1670 DATA 157,48,1,96,162,0,
     189,35,181,240,6,32,210,255,
     232,208,2052
47   1680 DATA 245,165,45,133,251
     ,165,46,133,252,165,252,197,
     48,208,7,165,2477
61   1690 DATA 251,197,47,208,1,9
     6,160,0,177,251,201,128,176,
     84,32,210,2219
12   1700 DATA 255,200,177,251,20
     1,127,176,17,32,210,255,32,1
     8,181,165,251,2548
7F   1710 DATA 164,252,32,227,207
     ,169,255,208,114,41,127,32,2
     10,255,169,36,2498
7F   1720 DATA 32,210,255,32,18,1
     81,169,34,32,210,255,160,0,1
     77,251,170,2186
97   1730 DATA 240,21,200,177,251
     ,133,34,200,177,251,133,35,1
     60,0,177,34,2223
88   1740 DATA 32,210,255,200,202
     ,208,247,169,34,32,210,255,2
     40,61,208,59,2622
CB   1750 DATA 176,151,41,127,32,
     210,255,200,177,251,201,127,
     176,18,32,210,2384
C7   1760 DATA 255,32,18,181,169,
     70,32,210,255,169,78,32,210,
     255,208,27,2201
5D   1770 DATA 41,127,32,210,255,
     169,37,32,210,255,32,18,181,
     160,0,177,1936
84   1780 DATA 251,133,98,200,177
     ,251,133,99,32,244,207,169,1
     3,32,210,255,2504
3F   1790 DATA 169,32,32,210,255,
     24,165,251,105,5,133,251,144
     ,2,230,252,2260
C3   1800 DATA 160,50,32,179,238,
     136,208,250,32,228,255,240,1
     8,201,3,240,2470
A7   1810 DATA 13,201,32,208,10,3
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    2,228,255,240,251,201,3,208,
    1,96,56,2035
1B  1820 DATA 176,142,169,61,32,
    210,255,24,165,251,105,2,133
    ,251,144,2,2122
3E  1830 DATA 230,252,96,147,13,
    32,32,32,32,32,32,32,32,60,6
    0,60,1174
03  1840 DATA 60,32,86,65,82,73,
    65,66,76,69,32,68,85,77,80,3
    2,1048
B9  1850 DATA 62,62,62,62,13,13,
    32,0,183,187,119,234,15,235,
    175,251,1705
9B  1860 DATA 180,234,177,106,33
    ,74,1,250,21,234,169,185,133
    ,251,169,182,2399
4B  1870 DATA 133,252,166,2,202,
    240,6,32,18,182,202,208,250,
    189,0,2,2084
EA  1880 DATA 240,43,201,34,240,
    7,232,224,87,208,242,240,32,
    32,3,204,2269
D9  1890 DATA 192,0,240,25,132,2
    ,160,0,165,34,133,253,165,35
    ,133,254,1923
A9  1900 DATA 177,253,145,251,20
    0,192,30,240,4,196,2,208,243
    ,169,0,145,2455
2B  1910 DATA 251,96,169,185,133
    ,251,169,182,133,252,169,8,1
    33,253,162,0,2546
C3  1920 DATA 189,86,182,240,6,3
    2,210,255,232,208,245,162,0,
    189,145,182,2563
17  1930 DATA 240,6,32,210,255,2
    32,208,245,232,134,2,169,32,
    32,210,255,2494
8B  1940 DATA 160,0,177,251,240,
    3,200,208,249,192,0,240,42,1
    69,34,32,2197
7C  1950 DATA 210,255,160,0,177,
    251,240,6,32,210,255,200,208
    ,246,169,34,2653
5A  1960 DATA 32,210,255,169,13,
    32,210,255,32,210,255,198,25
    3,240,32,32,2428
9A  1970 DATA 18,182,166,2,76,18
    9,181,185,128,182,240,231,32
    ,210,255,200,2477
39  1980 DATA 208,245,24,165,251
    ,105,31,133,251,165,252,105,
    0,133,252,96,2416
D4  1990 DATA 96,189,70,182,133,
    251,189,78,182,133,252,160,0
    ,177,251,240,2583
CF  2000 DATA 239,201,95,240,6,3
    2,210,255,200,208,242,169,13
    ,166,198,157,2631
CE  2010 DATA 119,2,230,198,208,
    218,185,247,53,115,216,22,84
    ,146,182,182,2407
30  2020 DATA 183,183,182,183,18
    3,183,13,32,32,32,60,60,60,6
    0,32,70,1548
A1  2030 DATA 85,78,67,84,73,79,
    78,32,75,69,89,32,68,69,70,7
    3,1121
97  2040 DATA 78,73,84,73,79,78,
    83,32,62,62,62,62,13,13,13,0
    ,867
DF  2050 DATA 75,69,89,32,78,79,
    84,32,68,69,70,73,78,69,68,4
    6,1079
59  2060 DATA 0,32,70,49,58,0,32
    ,70,50,58,0,32,70,51,58,0,63
    0
D9  2070 DATA 32,70,52,58,0,32,7
    0,53,58,0,32,70,54,58,0,32,6
    71
CB  2080 DATA 70,55,58,0,32,70,5
    6,58,0,73,78,70,79,58,95,0,8
    52
A1  2090 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
13  2100 DATA 0,0,0,0,0,0,0,0,65
    ,85,84,79,49,48,44,49,503
AF  2110 DATA 48,58,95,0,0,0,0,0
    ,0,0,0,0,0,0,0,0,201
5C  2120 DATA 0,0,0,0,0,0,0,82,8
    5,78,58,95,0,0,0,0,398
B9  2130 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
4B  2140 DATA 0,0,0,0,0,0,67,79,
    76,79,85,82,0,0,0,0,468
FD  2150 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
52  2160 DATA 0,0,0,0,0,64,76,95
    ,0,0,0,0,0,0,0,0,235
D1  2170 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
9E  2180 DATA 0,0,0,0,87,72,89,5
    8,95,0,0,0,0,0,0,0,401
C5  2190 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
5E  2200 DATA 0,0,0,68,73,82,58,
    95,0,0,0,0,0,0,0,0,376
39  2210 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
B3  2220 DATA 0,0,82,69,78,49,44
    ,49,58,95,0,0,0,0,0,0,524
2D  2230 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
70  2240 DATA 0,176,250,177,238,
    181,234,177,122,176,169,48,1
    33,252,169,2,2504
69  2250 DATA 133,253,169,0,133,
    144,169,36,133,251,169,251,1
    33,187,169,0,2330
E8  2260 DATA 133,188,165,253,13
    3,183,169,8,133,186,169,96,1
    33,185,32,213,2379
9E  2270 DATA 243,165,186,32,180
    ,255,165,185,32,150,255,164,
    144,208,77,160,2601
61  2280 DATA 6,132,251,32,165,2
    55,166,252,133,252,164,144,2
    08,62,164,251,2637
55  2290 DATA 136,208,238,164,25
    2,32,207,207,169,32,32,210,2
    55,32,165,255,2594
47  2300 DATA 166,144,208,40,170
    ,240,6,32,210,255,76,13,184,
    169,13,32,1958
ED  2310 DATA 210,255,32,228,255
    ,240,17,201,3,240,17,201,32,
    208,9,32,2180
1C  2320 DATA 228,255,240,251,20
    1,3,240,4,160,4,208,181,76,6
    6,246,168,2531
38  2330 DATA 161,234,129,234,16
    0,250,1,250,181,251,21,233,7
    7,235,32,167,2616
B7  2340 DATA 185,32,167,185,208
    ,31,32,230,184,32,167,185,32
    ,167,185,208,2230
27  2350 DATA 1,96,32,167,185,16
    5,99,145,122,32,167,185,165,
    98,145,122,1926
E0  2360 DATA 32,241,184,240,228
    ,32,167,185,32,167,185,32,16
    7,185,201,34,2312
2D  2370 DATA 208,11,32,167,185,
    240,199,201,34,208,247,240,2
    38,170,240,190,2810
A3  2380 DATA 16,233,162,4,221,1
    78,185,240,5,202,208,248,240
    ,221,165,122,2650
0C  2390 DATA 133,59,165,123,133
    ,60,32,115,0,176,211,32,84,1
    96,32,4,1555
05  2400 DATA 185,165,60,133,123
    ,165,59,133,122,160,0,162,0,
    189,0,1,1657
62  2410 DATA 240,17,72,32,115,0
    ,144,3,32,48,185,104,160,0,1
    45,122,1419
D2  2420 DATA 232,208,234,32,115
    ,0,176,8,32,63,185,32,121,0,
    144,248,1830
FC  2430 DATA 201,44,240,186,208
    ,152,165,53,133,99,165,54,13
    3,98,76,60,2067
0E  2440 DATA 196,165,99,24,101,
    49,133,99,165,98,101,50,133,
    98,32,167,1710
15  2450 DATA 185,208,251,96,32,
    230,184,32,167,185,32,167,18
    5,208,8,169,2339
79  2460 DATA 255,133,99,133,98,
    48,14,32,167,185,197,20,208,
    10,32,167,1798
E5  2470 DATA 185,197,21,208,6,7
    6,69,196,32,167,185,32,241,1
    84,240,215,2254
99  2480 DATA 32,80,185,230,251,
    32,131,185,230,45,208,2,230,
    46,96,32,2015
2F  2490 DATA 80,185,198,251,32,
    107,185,165,45,208,2,198,46,
    198,45,96,2041
B4  2500 DATA 32,90,185,160,0,13
    2,17,132,251,96,165,122,133,
    34,165,123,1837
27  2510 DATA 133,35,165,45,133,
    36,165,46,133,37,96,164,17,2
    00,177,34,1616
30  2520 DATA 164,251,200,145,34
    ,32,156,185,208,1,96,230,34,
    208,236,230,2410
6F  2530 DATA 35,208,232,164,17,
    177,36,164,251,145,36,32,156
    ,185,208,1,2047
67  2540 DATA 96,165,36,208,2,19
    8,37,198,36,76,131,185,165,3
    4,197,36,1800
E6  2550 DATA 208,4,165,35,197,3
    7,96,160,0,230,122,208,2,230
    ,123,177,1994
63  2560 DATA 122,96,0,137,138,1
    41,167,169,165,34,133,253,16
    5,35,133,254,2142
72  2570 DATA 32,215,187,160,0,1
    77,251,201,1,240,6,32,120,18
    7,76,197,2082
EE  2580 DATA 185,177,253,145,25
    1,200,192,16,240,6,196,2,240
    ,2,208,241,2554
E6  2590 DATA 238,250,191,169,0,
    145,251,162,0,189,0,2,201,34
    ,240,3,2075
2A  2600 DATA 232,208,246,232,18
    9,0,2,201,34,240,5,232,208,2
    46,240,22,2537
E3  2610 DATA 232,189,0,2,201,44
    ,208,14,32,176,207,32,25,186
    ,32,176,1756
A1  2620 DATA 207,160,20,32,32,1
    86,76,56,186,160,17,169,0,14
    5,251,200,1897
9C  2630 DATA 165,20,145,251,200
    ,165,21,145,251,96,208,2,240
    ,10,201,68,2188
0E  2640 DATA 208,3,76,243,186,7
    6,133,207,162,0,173,250,191,
    208,12,189,2317
44  2650 DATA 33,189,240,6,32,21
    0,255,232,208,245,96,169,15,
    133,2,133,2198
8B  2660 DATA 253,173,250,191,13
    3,17,189,119,188,240,6,32,21
    0,255,232,208,2696
57  2670 DATA 240,32,134,187,162
    ,0,189,157,188,240,6,32,210,
    255,232,208,2472
47  2680 DATA 245,32,215,187,169
    ,32,32,210,255,32,210,255,32
    ,210,255,169,2540
DF  2690 DATA 34,32,210,255,160,
    0,177,251,240,20,201,1,240,6
    ,32,210,2069
BE  2700 DATA 255,200,208,242,19
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    8,2,240,90,32,120,187,76,132
    ,186,169,34,2371
E7  2710 DATA 32,210,255,132,254
    ,56,169,18,229,254,141,211,1
    87,32,202,187,2569
20  2720 DATA 160,17,177,251,208
    ,38,200,177,251,170,200,177,
    251,168,32,198,2675
07  2730 DATA 187,169,32,32,210,
    255,169,45,32,210,255,169,32
    ,32,210,255,2294
52  2740 DATA 160,20,177,251,170
    ,200,177,251,168,32,198,187,
    169,13,32,210,2415
A5  2750 DATA 255,165,253,240,10
    ,198,17,240,9,32,120,187,76,
    116,186,76,2180
8D  2760 DATA 8,187,96,162,0,173
    ,250,191,208,3,76,63,185,169
    ,15,133,1920
2C  2770 DATA 2,169,0,133,253,76
    ,81,186,169,0,133,254,240,5,
    169,145,2015
D0  2780 DATA 32,210,255,162,0,1
    89,232,188,240,19,32,210,255
    ,232,208,245,2709
46  2790 DATA 162,0,189,3,189,24
    0,6,32,210,255,232,208,245,3
    2,228,255,2486
D3  2800 DATA 240,8,201,89,240,2
    7,201,78,240,38,32,225,255,2
    40,179,230,2523
BA  2810 DATA 254,165,254,201,20
    ,144,199,201,40,144,213,169,
    0,133,254,240,2631
88  2820 DATA 189,160,0,169,1,14
    5,251,160,17,169,3,145,251,2
    06,250,191,2307
D0  2830 DATA 166,214,202,142,13
    ,3,32,255,233,198,17,240,133
    ,32,120,187,2187
47  2840 DATA 169,145,32,210,255
    ,76,116,186,24,165,251,105,2
    2,133,251,165,2305
9E  2850 DATA 252,105,0,133,252,
    96,162,0,189,195,188,240,6,3
    2,210,255,2315
69  2860 DATA 232,208,245,24,162
    ,2,160,17,32,240,255,162,0,1
    89,139,190,2257
1A  2870 DATA 240,6,32,210,255,2
    32,208,245,24,162,3,160,17,3
    2,240,255,2321
1A  2880 DATA 162,0,189,158,190,
    240,6,32,210,255,232,208,245
    ,169,13,32,2341
E6  2890 DATA 210,255,32,210,255
    ,96,32,207,207,96,162,0,169,
    29,32,210,2202
49  2900 DATA 255,232,224,20,208
    ,246,96,169,176,133,251,169,
    190,133,252,96,2850
CC  2910 DATA 234,234,147,13,32,
    32,32,32,32,60,60,60,60,60,3
    2,32,1152
13  2920 DATA 69,65,83,89,32,66,
    65,83,73,67,32,86,49,46,49,3
    2,986
95  2930 DATA 32,62,62,62,62,62,
    13,13,32,32,32,32,32,32,32,3
    2,624
5A  2940 DATA 32,32,40,67,41,32,
    78,46,72,73,71,71,73,78,83,3
    2,921
27  2950 DATA 49,57,56,56,13,13,
    0,32,32,32,60,67,85,82,83,79
    ,796
CE  2960 DATA 82,62,32,32,32,32,
    32,32,83,67,82,69,69,78,46,4
    6,876
14  2970 DATA 46,32,32,32,32,32,
    32,32,32,32,32,32,32,32,32,3
    2,526
7C  2980 DATA 32,60,80,79,83,73,
    84,73,79,78,62,32,32,32,32,3
    2,943
1B  2990 DATA 67,79,76,79,85,82,
    46,46,46,32,32,32,32,32,32,3
    2,830
48  3000 DATA 32,32,32,32,32,32,
    0,147,32,32,32,32,32,32,60,6
    0,651
76  3010 DATA 60,60,32,83,85,66,
    82,79,85,84,73,78,69,32,76,7
    3,1117
43  3020 DATA 66,82,65,82,89,32,
    62,62,62,62,13,13,0,32,32,32
    ,786
DA  3030 DATA 32,32,32,60,70,73,
    76,69,78,65,77,69,62,32,32,3
    2,891
7E  3040 DATA 32,32,32,32,60,80,
    79,83,73,84,73,79,78,62,32,3
    2,943
79  3050 DATA 13,13,0,32,32,32,3
    2,80,82,79,71,82,65,77,32,78
    ,800
7C  3060 DATA 65,77,69,58,13,32,
    32,32,32,68,65,84,69,32,32,3
    2,792
0B  3070 DATA 32,32,32,32,32,58,
    13,0,32,32,32,32,32,32,32,32
    ,487
8B  3080 DATA 32,32,32,32,32,32,
    68,69,76,69,84,69,58,89,47,7
    8,899
A6  3090 DATA 32,13,0,145,32,32,
    32,32,32,32,32,32,32,32,32,3
    2,574
47  3100 DATA 32,18,32,68,69,76,
    69,84,69,58,89,47,78,32,146,
    13,980
F9  3110 DATA 0,13,78,79,45,70,7
    3,76,69,83,32,73,78,32,76,73
    ,950
B8  3120 DATA 66,82,65,82,89,33,
    13,0,13,83,85,66,82,79,85,84
    ,1007
00  3130 DATA 73,78,69,32,76,73,
    66,82,65,82,89,32,70,85,76,7
    6,1124
BB  3140 DATA 33,13,0,32,32,32,3
    2,66,69,71,32,79,70,32,66,65
    ,724
86  3150 DATA 83,73,67,32,80,82,
    71,58,13,32,32,32,32,69,78,6
    8,902
B3  3160 DATA 32,79,70,32,66,65,
    83,73,67,32,80,82,71,58,13,3
    2,935
68  3170 DATA 32,32,32,66,69,71,
    32,79,70,32,86,65,82,73,65,6
    6,952
0A  3180 DATA 76,69,83,58,13,32,
    32,32,32,69,78,68,32,79,70,3
    2,855
DB  3190 DATA 86,65,82,73,65,66,
    76,69,83,58,13,32,32,32,32,6
    6,930
12  3200 DATA 69,71,32,79,70,32,
    65,82,82,65,89,83,58,13,32,3
    2,954
E9  3210 DATA 32,32,69,78,68,32,
    79,70,32,65,82,82,65,89,83,5
    8,1016
28  3220 DATA 13,32,32,32,32,66,
    69,71,32,79,70,32,83,84,82,7
    3,882
9F  3230 DATA 78,71,83,58,13,32,
    32,32,32,69,78,68,32,79,70,3
    2,859
2A  3240 DATA 83,84,82,73,78,71,
    83,58,13,13,32,32,32,32,77,6
    9,912
50  3250 DATA 77,32,85,83,69,68,
    32,66,89,32,86,65,82,73,65,6
    6,1070
AB  3260 DATA 76,69,83,58,13,32,
    32,32,32,77,69,77,32,85,83,6
    9,919
ED  3270 DATA 68,32,66,89,32,65,
    82,82,65,89,83,58,13,13,32,3
    2,901
3B  3280 DATA 32,32,66,65,83,73,
    67,32,66,89,84,69,83,32,70,8
    2,1025
C3  3290 DATA 69,69,58,13,13,32,
    32,32,32,32,32,32,32,32,32,3
    2,574
E5  3300 DATA 32,32,32,32,32,32,
    32,32,32,32,32,32,32,32,32,3
    2,512
0D  3310 DATA 32,32,32,32,13,13,
    0,147,145,32,32,32,32,32,32,
    32,670
3D  3320 DATA 32,60,60,60,60,32,
    66,65,83,73,67,32,77,69,77,7
    9,992
42  3330 DATA 82,89,32,62,62,62,
    62,32,13,13,0,78,79,45,78,65
    ,854
4A  3340 DATA 77,69,0,0,0,0,0,0,
    0,0,0,0,0,0,78,79,303
8C  3350 DATA 45,68,65,84,69,0,0
    ,0,0,0,0,0,0,0,0,0,331
BE  3360 DATA 1,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,1
A2  3370 DATA 0,3,0,0,0,0,1,0,0,
    0,0,0,0,0,0,0,0,4
94  3380 DATA 0,0,0,0,0,0,0,3,0,
    0,0,0,1,0,0,0,0,4
98  3390 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,3,0,0,3
86  3400 DATA 0,0,1,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,1
8A  3410 DATA 0,0,0,3,0,0,0,0,1,
    0,0,0,0,0,0,0,0,4
FC  3420 DATA 0,0,0,0,0,0,0,0,0,
    3,0,0,0,0,1,0,4
E0  3430 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,3,3
EE  3440 DATA 0,0,0,0,1,0,0,0,0,
    0,0,0,0,0,0,0,0,1
D2  3450 DATA 0,0,0,0,0,3,0,0,0,
    0,1,0,0,0,0,0,4
C2  3460 DATA 0,0,0,0,0,0,0,0,0,
    0,0,3,0,0,0,0,3
C8  3470 DATA 1,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,1
30  3480 DATA 0,3,0,0,0,0,1,0,0,
    0,0,0,0,0,0,0,0,4
3A  3490 DATA 0,0,0,0,0,0,0,3,0,
    0,0,0,1,0,0,0,4
2A  3500 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,3,0,0,3
10  3510 DATA 0,0,1,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,1
18  3520 DATA 0,0,0,3,0,0,0,0,1,
    0,0,0,0,0,0,0,0,4
02  3530 DATA 0,0,0,0,0,0,0,0,0,
    3,0,0,0,0,1,0,4
7B  3540 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,3,3
78  3550 DATA 0,0,0,0,1,0,0,0,0,
    0,0,0,0,0,0,0,0,1
CE  3560 DATA 0,0,0,0,0,0,0,0,3,
    0,0,181,74,37,221,164,680
31  3570 DATA 169,148,141,0,160,
    169,1,168,145,43,32,51,165,1
    65,34,105,1696
B2  3580 DATA 2,133,45,165,35,10
    5,0,133,46,76,96,166,32,115,
    0,32,1181
62  3590 DATA 37,192,76,174,167,
    201,204,144,4,201,236,144,6,
    32,121,0,1939
A5  3600 DATA 76,237,167,56,233,
    204,10,170,188,68,192,72,189
    ,67,192,72,2194
EF  3610 DATA 76,115,0,3,154,49,
    207,119,185,190,207,94,196,7
    4,197,255,2711
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4D  3620 DATA 191,64,199,105,200
    ,25,201,126,201,215,201,167,
    202,27,199,47,2370
C8  3630 DATA 199,114,204,120,20
    4,24,204,59,205,82,205,221,1
    94,238,195,64,2532
77  3640 DATA 206,229,203,217,20
    7,127,203,139,203,59,202,155
    ,166,57,195,163,2731
2A  3650 DATA 203,89,201,166,122
    ,160,4,132,15,189,0,2,16,7,2
    01,255,1762
13  3660 DATA 240,62,232,208,244
    ,201,32,240,55,133,8,201,34,
    240,85,36,2251
99  3670 DATA 15,112,45,201,63,2
    08,4,169,153,208,37,201,48,1
    44,4,201,1813
06  3680 DATA 60,144,29,132,113,
    160,0,132,11,136,134,122,202
    ,200,232,189,1996
6E  3690 DATA 0,2,56,249,158,160
    ,240,245,201,128,208,47,5,11
    ,164,113,1987
12  3700 DATA 232,200,153,251,1,
    201,0,240,56,56,233,58,240,4
    ,201,73,2199
2E  3710 DATA 208,2,133,15,56,23
    3,85,208,160,133,8,189,0,2,2
    40,224,1896
F8  3720 DATA 197,8,240,220,200,
    153,251,1,232,208,240,166,12
    2,230,11,200,2679
F6  3730 DATA 185,157,160,16,250
    ,185,158,160,208,181,240,15,
    189,0,2,16,2122
61  3740 DATA 189,153,253,1,198,
    123,169,255,133,122,96,160,0
    ,185,139,193,2369
C6  3750 DATA 208,2,200,232,189,
    0,2,56,249,139,193,240,245,2
    01,128,208,2492
8D  3760 DATA 4,5,11,208,153,166
    ,122,230,11,200,185,138,193,
    16,250,185,2077
7F  3770 DATA 139,193,208,224,24
    0,198,16,15,36,15,48,11,201,
    255,240,7,2046
26  3780 DATA 201,204,176,22,76,
    36,167,72,152,72,32,139,207,
    144,5,104,1809
E7  3790 DATA 104,76,116,164,104
    ,168,104,76,243,166,56,233,2
    03,170,132,73,2188
F7  3800 DATA 160,255,202,240,8,
    200,185,139,193,16,250,48,24
    5,200,185,139,2665
B7  3810 DATA 193,48,5,32,71,171
    ,208,245,76,239,166,73,78,70
    ,207,76,1958
54  3820 DATA 73,194,65,85,84,20
    7,68,73,210,72,69,216,68,69,
    195,79,1827
41  3830 DATA 76,196,70,73,78,19
    6,68,69,204,80,82,79,84,69,6
    7,212,1703
D1  3840 DATA 67,79,76,79,85,210
    ,68,79,211,65,80,208,86,84,6
    5,194,1736
FF  3850 DATA 72,84,65,194,64,20
    4,64,211,68,69,86,73,67,197,
    78,65,1661
9E  3860 DATA 77,197,68,65,84,19
    7,87,72,217,82,69,206,68,85,
    77,208,1859
D8  3870 DATA 75,69,89,198,86,65
    ,210,83,87,73,84,67,200,75,7
    3,76,1610
DE  3880 DATA 204,77,69,210,192,
    66,83,65,86,197,66,76,79,65,
    196,72,1803
C8  3890 DATA 69,76,208,0,240,3,
    76,8,175,32,38,181,32,213,20
    4,169,1724
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BC  3900 DATA 103,133,251,169,19
    0,133,252,32,102,195,32,134,
    187,169,83,133,2298
A6  3910 DATA 251,169,189,133,25
    2,32,102,195,32,220,204,169,
    255,133,2,32,2370
05  3920 DATA 181,194,166,43,165
    ,44,32,205,189,32,181,194,16
    5,46,166,45,2048
98  3930 DATA 32,205,189,32,181,
    194,166,45,165,46,32,205,189
    ,32,181,194,2088
21  3940 DATA 165,48,166,47,32,2
    05,189,32,181,194,166,47,165
    ,48,32,205,1922
E9  3950 DATA 189,32,181,194,165
    ,50,166,49,32,205,189,32,181
    ,194,166,51,2076
1A  3960 DATA 165,52,32,205,189,
    32,181,194,166,55,165,56,32,
    205,189,32,1950
4C  3970 DATA 181,194,56,165,47,
    229,45,170,165,48,229,46,32,
    205,189,32,2033
62  3980 DATA 181,194,56,165,49,
    229,47,170,165,50,229,48,32,
    205,189,32,2041
FC  3990 DATA 181,194,56,165,51,
    229,49,170,165,52,229,50,32,
    205,189,32,2049
B4  4000 DATA 181,194,76,116,164
    ,230,2,166,2,189,198,194,133
    ,214,189,210,2458
CD  4010 DATA 194,133,211,76,108
    ,229,5,6,7,8,9,10,11,12,14,1
    5,1048
37  4020 DATA 17,19,24,24,24,24,
    24,24,24,24,26,26,26,0,240,3
    ,549
BA  4030 DATA 76,8,175,174,101,1
    95,134,21,174,100,195,134,20
    ,32,19,166,1724
A1  4040 DATA 144,69,169,0,160,1
    ,32,30,171,160,3,132,252,169
    ,32,41,1565
4E  4050 DATA 127,32,71,171,201,
    34,208,6,165,252,73,128,133,
    252,200,177,2230
BC  4060 DATA 95,240,36,16,236,2
    01,255,240,232,36,252,48,228
    ,133,251,162,2661
FD  4070 DATA 255,232,189,157,16
    0,16,250,198,251,48,246,232,
    189,157,160,48,2788
3F  4080 DATA 206,32,22,231,76,4
    3,195,76,215,170,32,212,225,
    32,253,174,2194
F4  4090 DATA 32,138,173,32,247,
    183,165,20,72,165,21,72,32,2
    53,174,32,1811
A3  4100 DATA 138,173,32,247,183
    ,166,20,164,21,104,133,254,1
    04,133,253,169,2294
DD  4110 DATA 253,76,95,225,52,2
    55,160,0,177,251,240,11,32,2
    10,255,200,2492
67  4120 DATA 208,246,230,252,76
    ,104,195,96,240,2,144,3,76,8
    ,175,32,2087
0F  4130 DATA 138,173,32,247,183
    ,165,20,133,251,165,21,133,2
    52,32,155,183,2283
62  4140 DATA 134,253,169,156,14
    1,2,3,169,195,141,3,3,173,0,
    2,240,1784
F3  4150 DATA 32,166,251,165,252
    ,32,206,195,134,198,189,0,2,
    157,119,2,2100
38  4160 DATA 202,16,247,24,165,
    251,101,253,133,251,144,2,23
    0,252,76,131,2478
3B  4170 DATA 164,169,38,141,2,3
    ,169,206,141,3,3,108,2,3,134
    ,99,1385
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7E  4180 DATA 133,98,162,144,56,
    32,73,188,32,223,189,32,135,
    180,32,166,1875
A2  4190 DATA 182,162,0,189,0,1,
    157,0,2,240,3,232,208,245,96
    ,208,1925
B8  4200 DATA 15,169,10,133,53,1
    33,49,169,0,133,54,133,50,76
    ,25,196,1398
EE  4210 DATA 32,107,169,165,20,
    133,53,166,21,134,54,32,253,
    174,32,107,1652
F9  4220 DATA 169,165,20,166,21,
    133,49,134,50,32,142,166,32,
    213,204,32,1728
B3  4230 DATA 78,184,32,220,204,
    32,51,165,165,34,164,35,24,1
    05,2,133,1628
66  4240 DATA 45,144,1,200,132,4
    6,32,89,166,76,116,164,32,22
    0,204,32,1699
E6  4250 DATA 142,166,76,213,204
    ,32,220,204,162,144,56,32,73
    ,188,32,223,2167
D3  4260 DATA 189,76,213,204,168
    ,32,220,204,152,32,107,169,7
    6,213,204,201,2460
CA  4270 DATA 44,240,3,76,8,175,
    162,0,134,2,232,232,134,253,
    189,0,1884
00  4280 DATA 2,240,15,201,71,17
    6,236,201,48,144,232,208,2,2
    30,2,232,2240
DE  4290 DATA 208,236,224,6,144,
    221,224,7,176,217,169,4,133,
    254,169,52,2444
DC  4300 DATA 160,197,32,30,171,
    162,2,189,0,2,240,6,32,210,2
    55,232,1920
D1  4310 DATA 208,245,169,0,133,
    97,162,4,149,139,202,208,251
    ,169,133,133,2402
A2  4320 DATA 139,169,60,160,197
    ,32,30,171,166,253,189,0,2,2
    01,65,144,1978
64  4330 DATA 2,233,8,233,47,32,
    126,189,198,254,240,12,169,1
    39,160,0,2042
75  4340 DATA 32,40,186,230,253,
    ,21,32,135,1776
    76,184,196,166,2,224,4,208,1
    1,32,59,1903
68  4350 DATA 171,169,48,32,210,
    255,76,243,196,32,221,189,13
    3,122,132,123,2352
91  4360 DATA 32,30,171,32,115,0
    ,32,243,188,32,247,183,169,6
    7,160,197,1898
88  4370 DATA 32,30,171,165,21,2
    40,21,162,8,6,21,176,4,169,4
    8,208,1482
EC  4380 DATA 2,169,49,32,210,25
    5,202,208,240,32,59,171,162,
    8,6,20,1825
AA  4390 DATA 176,4,169,48,208,2
    ,169,49,32,210,255,202,208,2
    40,32,215,2219
DE  4400 DATA 170,76,116,164,13,
    72,69,88,32,61,32,0,13,68,69
    ,67,1110
45  4410 DATA 32,61,0,13,66,73,7
    8,32,61,32,0,32,253,174,32,1
    38,1077
A9  4420 DATA 173,32,247,183,169
    ,60,160,197,32,30,171,32,59,
    171,165,21,1902
69  4430 DATA 166,20,32,205,189,
    169,52,160,197,32,30,171,165
34  4440 DATA 197,32,210,255,152
    ,32,210,255,165,20,32,135,19
    7,32,210,255,2389
95  4450 DATA 152,32,210,255,76,
    252,196,170,41,240,74,74,74,
    74,32,155,2107
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E1   4460 DATA 197,72,138,41,15,3
     2,155,197,168,104,96,201,10,
     144,3,24,1597
49   4470 DATA 105,7,105,48,96,16
     5,157,16,38,173,141,2,201,1,
     240,37,1532
DB   4480 DATA 165,204,208,27,165
     ,207,208,23,165,203,201,3,14
     4,17,240,37,2217
4E   4490 DATA 201,5,240,14,201,6
     ,240,56,201,4,208,3,76,73,19
     8,76,1802
B9   4500 DATA 72,235,76,46,198,1
     65,203,201,3,208,3,76,106,19
     8,201,5,1996
25   4510 DATA 208,237,76,152,198
     ,32,27,198,32,94,198,164,211
     ,192,39,240,2298
DD   4520 DATA 82,192,79,240,78,2
     00,132,211,232,236,44,198,20
     8,239,240,67,2678
21   4530 DATA 32,27,198,32,94,19
     8,164,211,192,0,240,55,192,4
     0,240,51,1966
46   4540 DATA 136,132,211,232,23
     6,44,198,208,239,240,40,162,
     0,134,212,134,2558
63   4550 DATA 204,160,176,32,179
     ,238,136,208,250,162,0,96,20
     ,12,32,27,1932
41   4560 DATA 198,32,94,198,164,
     214,192,24,240,9,200,132,214
     ,232,236,45,2424
84   4570 DATA 198,208,241,32,108
     ,229,76,72,235,32,27,198,32,
     94,198,164,2144
5E   4580 DATA 214,240,240,136,13
     2,214,232,236,45,198,208,243
     ,240,229,165,211,3183
18   4590 DATA 201,40,144,5,56,23
     3,40,133,211,96,197,197,240,
     39,165,212,2209
ED   4600 DATA 208,18,169,64,133,
     203,234,234,234,234,234,234,
     234,234,234,234,3135
D4   4610 DATA 234,234,165,212,73
     ,1,133,212,234,234,234,234,2
     34,234,234,234,3136
E9   4620 DATA 234,234,32,33,198,
     76,72,235,173,136,2,141,22,1
     99,141,186,2114
BE   4630 DATA 198,173,134,2,162,
     79,157,0,216,202,208,250,32,
     213,204,162,2392
23   4640 DATA 0,189,39,188,240,8
     ,41,63,157,0,4,232,208,243,3
     2,220,1864
19   4650 DATA 204,165,210,133,98
     ,165,209,133,99,32,234,198,3
     2,248,198,162,2520
E4   4660 DATA 25,32,12,199,165,2
     44,133,98,165,243,133,99,32,
     234,198,32,2044
0C   4670 DATA 248,198,162,65,32,
     12,199,76,72,235,24,165,99,1
     01,211,133,2032
BB   4680 DATA 99,165,98,105,0,13
     3,98,96,169,0,133,97,133,13,
     162,144,1645
DA   4690 DATA 56,32,73,188,32,22
     1,189,133,92,132,93,96,160,0
     ,177,92,1766
D4   4700 DATA 240,9,41,63,157,1,
     4,232,200,208,243,96,208,3,7
     6,8,1789
2B   4710 DATA 175,32,158,183,224
     ,0,240,246,224,25,176,242,14
     2,45,198,96,2406
B5   4720 DATA 240,236,32,158,183
     ,224,0,240,229,224,40,176,22
     5,142,44,198,2591
6A   4730 DATA 96,208,3,76,8,175,
     162,80,169,0,141,199,199,157
     ,167,2,1842
DC   4740 DATA 202,16,250,160,1,1
     85,0,2,240,10,153,170,2,200,
     192,89,1872
1C   4750 DATA 208,243,240,223,19
     2,1,240,219,169,13,32,210,25
     5,32,115,199,2591
43   4760 DATA 76,116,164,162,167
     ,169,2,134,251,133,252,166,4
     3,165,44,160,2204
C7   4770 DATA 1,134,253,133,254,
     177,253,208,1,96,133,89,136,
     177,253,133,2431
9C   4780 DATA 88,160,4,132,90,13
     2,91,177,251,201,34,208,2,23
     0,91,164,2055
FA   4790 DATA 91,177,251,240,30,
     133,255,164,90,177,253,240,1
     6,165,255,209,2746
F6   4800 DATA 253,240,6,230,90,1
     60,4,208,220,230,90,208,224,
     166,88,165,2582
21   4810 DATA 89,208,188,32,223,
     199,169,0,240,15,166,20,165,
     21,32,205,1972
61   4820 DATA 189,169,32,32,202,
     241,76,189,199,32,235,199,76
     ,189,199,160,2419
05   4830 DATA 2,177,253,133,20,2
     00,177,253,133,21,96,32,19,1
     66,160,1,1843
99   4840 DATA 132,15,177,95,240,
     64,32,44,168,200,177,95,170,
     200,177,95,2081
81   4850 DATA 197,21,208,4,228,2
     0,240,2,176,44,132,73,32,205
     ,189,169,1940
39   4860 DATA 32,164,73,41,127,3
     2,71,171,201,34,208,6,165,15
     ,73,255,1668
9C   4870 DATA 133,15,200,240,17,
     177,95,208,19,168,177,95,170
     ,200,177,95,2186
2E   4880 DATA 134,95,133,96,208,
     184,169,13,32,210,255,96,16,
     215,201,255,2312
3F   4890 DATA 240,211,36,15,48,2
     07,56,233,127,170,132,73,160
     ,255,202,240,2405
2C   4900 DATA 8,200,185,158,160,
     16,250,48,245,200,185,158,16
     0,48,178,32,2231
04   4910 DATA 71,171,208,245,169
     ,13,32,210,255,96,144,3,76,8
     ,175,32,1908
CF   4920 DATA 138,173,32,247,183
     ,32,19,166,144,242,166,95,13
     4,253,166,96,2286
0F   4930 DATA 134,254,32,121,0,2
     01,44,208,227,32,115,0,208,1
     5,56,165,1812
5F   4940 DATA 45,233,2,133,95,16
     5,46,233,0,133,96,208,27,176
     ,205,32,1829
2C   4950 DATA 138,173,32,247,183
     ,230,20,32,19,166,166,254,22
     8,96,144,8,2136
1E   4960 DATA 208,186,166,253,22
     8,95,176,180,160,0,165,95,14
     5,253,200,165,2675
18   4970 DATA 96,145,253,200,177
     ,253,170,200,177,253,134,99,
     133,98,162,144,2694
C7   4980 DATA 56,32,73,188,32,22
     3,189,32,135,180,32,166,182,
     162,0,189,1871
50   4990 DATA 0,1,157,0,2,240,3,
     232,208,245,104,104,162,255,
     173,2,1888
F3   5000 DATA 3,141,8,201,173,3,
     3,141,13,201,169,7,141,2,3,1
     69,1378
61   5010 DATA 201,141,3,3,76,134
     ,164,169,131,141,2,3,169,164
     ,141,3,1645
19   5020 DATA 3,32,51,165,32,10,
     192,76,116,164,240,43,201,34
     ,240,3,1602
64   5030 DATA 76,8,175,32,212,22
     5,32,213,204,76,0,179,32,220
     ,204,32,1920
FB   5040 DATA 51,165,32,89,166,7
     6,116,164,32,220,204,32,51,1
     65,32,89,1684
6D   5050 DATA 166,32,213,204,76,
     106,179,173,250,204,72,169,8
     8,141,250,204,2527
7E   5060 DATA 32,227,204,104,141
     ,250,204,76,38,201,208,196,3
     2,213,204,32,2362
5C   5070 DATA 145,177,76,220,204
     ,76,116,164,144,5,28,159,156
     ,30,31,158,1889
54   5080 DATA 129,149,150,151,15
     2,153,154,155,82,69,77,34,14
     1,153,0,32,1781
25   5090 DATA 235,183,165,20,133
     ,251,165,21,133,252,224,16,1
     44,3,76,8,2029
E5   5100 DATA 175,160,5,189,104,
     201,153,120,201,166,251,165,
     252,32,206,195,2575
C5   5110 DATA 160,0,185,120,201,
     157,0,2,240,4,232,200,208,24
     4,173,2,2128
D6   5120 DATA 3,141,204,201,173,
     3,3,141,209,201,169,203,141,
     2,3,169,1966
02   5130 DATA 201,141,3,3,162,25
     5,160,1,76,134,164,169,38,14
     1,2,3,1653
1A   5140 DATA 169,206,141,3,3,76
     ,116,164,208,6,169,0,133,2,2
     40,11,1647
2B   5150 DATA 201,34,240,3,76,8,
     175,169,255,133,2,169,15,32,
     195,255,1962
02   5160 DATA 32,1,202,32,192,25
     5,176,6,169,15,32,195,255,96
     ,76,249,1983
14   5170 DATA 224,169,0,32,189,2
     55,169,15,168,162,8,32,186,2
     55,165,2,2031
24   5180 DATA 240,7,32,6,226,32,
     87,226,96,169,0,32,192,255,1
     76,222,1998
B4   5190 DATA 162,15,32,198,255,
     32,207,255,201,13,240,5,32,2
     10,255,208,2320
AA   5200 DATA 244,169,15,32,195,
     255,32,204,255,104,104,96,32
     ,68,204,32,2041
40   5210 DATA 23,203,134,43,132,
     44,160,0,152,145,43,32,201,2
     02,134,45,1693
93   5220 DATA 132,46,32,51,165,3
     2,6,203,169,145,160,202,141,
     2,3,140,1629
B9   5230 DATA 3,3,169,1,133,123,
     169,255,133,122,160,0,177,25
     1,133,253,2085
4F   5240 DATA 200,177,251,133,25
     4,240,36,200,177,251,133,20,
     200,177,251,133,2833
F5   5250 DATA 21,162,4,232,200,1
     77,251,157,251,1,208,247,138
     ,168,32,162,2411
6B   5260 DATA 164,165,253,166,25
     4,133,251,134,252,208,199,16
     9,38,160,206,141,2893
9C   5270 DATA 2,3,140,3,3,76,116
     ,164,32,68,204,32,23,203,138
     ,56,1263
DC   5280 DATA 233,2,133,43,152,2
     33,0,133,44,32,201,202,134,2
     51,132,252,2177
EC   5290 DATA 32,6,203,32,51,165
     ,76,116,164,32,212,225,169,0
     ,133,185,1801
A1   5300 DATA 166,43,164,44,32,2
     13,255,176,16,32,183,255,41,
     191,240,8,2059
BC   5310 DATA 32,241,202,162,29,
     76,55,164,96,72,32,241,202,1
     04,76,249,2033
66   5320 DATA 224,165,251,56,233
     ,2,133,20,165,252,233,0,133,
     252,169,0,2288
A7   5330 DATA 168,145,20,200,145
     ,20,165,253,166,254,133,43,1
     34,44,165,251,2306
9B   5340 DATA 166,252,133,45,134
     ,46,96,165,43,133,253,165,44
     ,133,254,166,2228
BA   5350 DATA 45,164,46,134,251,
     132,252,96,173,141,2,201,1,2
     08,10,165,2021
3C   5360 DATA 203,201,4,240,25,2
     01,6,240,3,76,49,234,165,204
     ,208,11,2070
9C   5370 DATA 169,24,133,214,169
     ,0,133,211,32,108,229,76,49,
     234,173,32,1986
95   5380 DATA 208,141,127,203,32
     ,118,203,238,32,208,32,159,2
     55,173,141,2,2272
EB   5390 DATA 201,1,208,243,165,
     197,201,4,208,237,32,118,203
     ,173,127,203,2521
A9   5400 DATA 141,32,208,76,49,2
     34,160,255,32,179,238,136,20
     8,250,96,249,2543
C9   5410 DATA 173,59,206,73,255,
     141,59,206,32,149,205,96,208
     ,92,32,138,2124
BB   5420 DATA 255,32,83,228,32,2
     23,205,234,234,169,235,141,1
     44,2,169,72,2458
5B   5430 DATA 141,143,2,96,169,0
     ,133,10,32,212,225,32,253,17
     4,32,138,1792
F4   5440 DATA 173,32,247,183,169
     ,0,166,20,164,21,76,117,225,
     32,213,204,2042
09   5450 DATA 32,229,178,76,220,
     204,165,1,201,55,144,23,165,
     157,16,19,1885
AE   5460 DATA 165,215,56,233,133
     ,201,8,176,10,170,32,213,204
     ,32,33,182,2063
BB   5470 DATA 32,220,204,76,49,2
     34,240,40,144,3,76,8,175,32,
     158,183,1874
C4   5480 DATA 224,1,144,246,224,
     9,176,242,134,2,32,213,204,3
     2,90,181,2154
AB   5490 DATA 76,220,204,32,220,
     204,32,158,173,32,166,182,16
     8,76,213,204,2360
1A   5500 DATA 32,213,204,32,162,
     181,76,220,204,208,3,76,8,17
     5,32,158,1984
3B   5510 DATA 183,224,1,240,6,22
     4,8,240,2,208,240,142,51,204
     ,142,62,2177
C6   5520 DATA 204,96,169,8,133,1
     86,169,0,133,10,76,165,244,1
     69,8,133,1903
C5   5530 DATA 186,76,237,245,169
     ,0,133,251,169,2,133,252,160
     ,1,177,251,2442
92   5540 DATA 201,34,240,11,169,
     32,145,251,200,192,87,208,24
     1,240,188,200,2639
C3   5550 DATA 177,251,201,34,240
     ,7,200,192,87,208,245,240,17
     4,200,169,0,2625
69   5560 DATA 145,251,96,32,68,2
     04,76,104,225,240,6,32,68,20
     4,76,86,1913
86   5570 DATA 225,173,250,204,72
     ,169,80,141,250,204,32,227,2
     04,104,141,250,2726
34   5580 DATA 204,32,220,204,76,
     89,225,160,255,174,62,204,16
     9,0,32,186,2292
9D   5590 DATA 255,32,227,204,162
     ,4,181,42,149,250,202,208,24
     9,169,139,133,2606
69   5600 DATA 43,169,190,133,44,
     169,251,133,45,169,191,133,4
     6,166,45,164,2091
4B   5610 DATA 46,169,43,32,216,2
     55,32,220,204,162,4,181,250,
     149,42,202,2207
EB   5620 DATA 208,249,76,116,164
     ,165,1,41,254,133,1,96,165,1
     ,9,1,1680
1D   5630 DATA 133,1,96,32,213,20
     4,162,0,189,139,190,240,6,15
     7,167,2,1931
B1   5640 DATA 232,208,245,169,40
     ,157,167,2,232,169,76,157,16
     7,2,232,138,2393
B2   5650 DATA 162,167,160,2,32,1
     89,255,96,32,220,204,32,68,2
     04,32,212,2067
DD   5660 DATA 225,32,213,204,160
     ,255,174,62,204,169,1,32,186
     ,255,162,6,2340
C9   5670 DATA 181,44,157,51,3,20
     2,208,248,169,0,133,10,32,21
     3,255,162,2068
55   5680 DATA 6,189,51,3,149,44,
     202,208,248,76,113,207,201,3
     4,240,3,1974
AE   5690 DATA 76,8,175,169,139,1
     33,251,169,190,133,252,169,1
     4,141,127,205,2351
B6   5700 DATA 76,100,205,201,34,
     208,233,169,158,133,251,169,
     190,133,252,169,2681
A8   5710 DATA 17,141,127,205,32,
     158,173,32,166,182,201,0,240
     ,210,133,2,2019
E4   5720 DATA 32,213,204,160,0,1
     77,34,145,251,196,2,240,5,20
     0,192,17,2068
02   5730 DATA 208,243,169,0,145,
     251,76,220,204,32,149,205,32
     ,192,205,32,2363
AF   5740 DATA 189,203,76,116,164
     ,120,173,59,206,240,22,169,1
     65,141,143,2,2188
5C   5750 DATA 169,197,141,144,2,
     169,40,141,20,3,169,203,141,
     21,3,88,1651
DB   5760 DATA 96,169,198,141,20,
     3,169,203,141,21,3,32,153,20
     3,88,96,1736
66   5770 DATA 162,7,189,51,206,1
     57,2,3,202,16,247,169,50,141
     ,48,3,1653
4A   5780 DATA 169,204,141,49,3,1
     69,61,141,50,3,169,204,141,5
     1,3,169,1727
22   5790 DATA 244,141,24,3,169,2
     05,141,25,3,169,206,141,23,3
     ,169,20,1686
0C   5800 DATA 141,22,3,96,72,138
     ,72,152,72,169,127,141,13,22
     1,172,13,1624
42   5810 DATA 221,16,3,76,114,25
     4,32,188,246,32,225,255,240,
     6,76,114,2098
6F   5820 DATA 254,234,234,234,32
     ,163,253,32,24,229,32,149,20
     5,32,192,205,2504
34   5830 DATA 32,189,203,108,2,1
     60,165,57,141,100,195,165,58
     ,141,101,195,2012
7B   5840 DATA 76,131,164,38,206,
     131,192,70,193,28,192,255,19
     2,70,193,28,2159
88   5850 DATA 192,208,3,76,8,175
     ,201,68,208,5,141,49,207,240
     ,7,201,1989
AA   5860 DATA 72,208,240,141,49,
     207,32,115,0,32,253,174,32,1
     38,173,32,1898
83   5870 DATA 247,183,165,20,133
     ,251,165,21,133,252,169,46,3
     2,210,255,32,2314
09   5880 DATA 244,206,32,59,171,
     162,5,160,0,177,251,32,183,2
     06,32,59,1979
9F   5890 DATA 171,200,202,16,244
     ,169,58,32,210,255,162,5,160
     ,0,177,251,2312
6A   5900 DATA 201,32,48,4,201,12
     8,144,2,169,46,32,210,255,20
     0,202,16,1890
1B   5910 DATA 237,32,215,170,32,
     139,207,176,51,24,165,251,10
     5,6,133,251,2194
56   5920 DATA 144,184,230,252,76
     ,106,206,134,253,132,254,174
     ,49,207,224,72,2697
BA   5930 DATA 240,27,170,169,48,
     224,100,176,10,224,10,176,3,
     32,210,255,2074
6D   5940 DATA 32,210,255,169,0,3
     2,205,189,166,253,164,254,96
     ,170,169,36,2400
41   5950 DATA 32,210,255,138,32,
     135,197,32,210,255,152,32,21
     0,255,32,179,2356
71   5960 DATA 238,76,216,206,166
     ,251,165,252,172,49,207,192,
     72,240,42,133,2677
12   5970 DATA 98,134,99,162,144,
     56,32,73,188,32,223,189,162,
     0,189,0,1781
30   5980 DATA 1,240,3,232,208,24
     8,169,48,224,5,240,6,32,210,
     255,232,2353
F8   5990 DATA 208,246,169,0,160,
     1,76,30,171,32,221,206,165,2
     51,76,228,2240
42   6000 DATA 206,72,72,32,213,2
     04,32,115,0,104,208,7,32,56,
     186,240,1779
00   6010 DATA 48,208,46,201,68,2
     08,7,32,243,186,240,37,208,3
     5,201,70,2038
33   6020 DATA 208,37,32,213,204,
     173,250,191,201,15,240,71,32
     ,220,204,32,2323
50   6030 DATA 158,173,32,166,182
     ,201,0,240,31,133,2,32,213,2
     04,32,184,1983
C4   6040 DATA 185,32,220,204,76,
     116,164,201,83,208,3,76,151,
     204,201,76,2200
5C   6050 DATA 208,3,76,8,205,32,
     220,204,76,8,175,32,228,255,
     201,3,1934
30   6060 DATA 240,15,201,32,208,
     9,32,228,255,240,251,201,3,2
     40,2,24,2181
11   6070 DATA 96,56,96,162,0,189
     ,57,189,240,199,32,210,255,2
     32,208,245,2466
A1   6080 DATA 32,220,204,32,253,
     174,32,138,173,32,247,183,76
     ,213,204,240,2453
E6   6090 DATA 2,208,197,32,213,2
     04,32,186,183,32,220,204,76,
     116,164,72,2141
E5   6100 DATA 32,220,204,104,32,
     205,189,76,213,204,32,213,20
     4,32,31,180,2171
66   6110 DATA 76,220,204,170,32,
     220,204,138,32,162,187,32,22
     1,189,32,30,2149
80   6120 DATA 171,76,213,204,32,
     220,204,162,144,32,68,188,24
     0,237,208,0,2399
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Two copies of your program on tape or disk.
A description of your problem.
If possible a listing of your work (you may omit this).
A stamped, self-addressed envelope for return of the program to you.

Should any of the above be missing then we will not be able to deal with your query.

We will try to point out where you have made errors and place a corrected copy of the program back on to your tape or disk before we return it to you.

Do not send a program to us as soon as it stops working, please check it several times first.

We do get a large number of queries and so it may take a while for us to deal with yours personally.
Note: we can only deal with problems relating to programs published in *Your Commodore*.

```
PROGRAM:SAVER

06  10 BL=4:LN=50:SA=40704
61  20 FORL=0TOBL:CX=0:FORD=0TO1
    5:READA:CX=CX+A:POKESA+L*16+
    D,A:POKE53280,A:NEXTD
A5  30 READ A:IF A><CX THENPRINT
    "ERROR IN LINE";LN+(L*10):ST
    OP
40  40 NEXT L:END
81  50 DATA 120,169,0,41,254,133
    ,0,88,169,1,162,8,160,1,32,1
    86,1524
A0  60 DATA 255,169,15,162,52,16
    0,159,32,189,255,169,0,133,2
    53,169,170,2342
43  70 DATA 133,254,169,253,162,
    0,160,208,32,216,255,120,165
    ,0,9,1,2137
DD  80 DATA 133,0,88,96,69,65,83
    ,89,32,66,65,83,73,67,32,86,
    1127
80  90 DATA 49,46,49,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,137
```

Commodore Where Are You?

At the *Your Commodore* office we are repeatedly asked for the address and telephone number of Commodore U.K. Many people, after referring to their computer manuals, believe them to be based in Corby.

The Commodore plant at Corby was closed down some time ago. Reproduced here you will find the correct address for Commodore U.K.

We suggest that you write this correct address in the front of your computers manual for future reference.

Commodore Business Machine, (UK),
Commodore House,
The Switchback,
Gardner Road,
Maidenhead,
Berks SL6 7XA.

At the *Your Commodore* office we receive hundreds of letters from readers every month. We do try and answer each individually but sometimes this is impossible due to pressure of work. If you have written to us and not received a personal reply, we apologise for this but we cannot promise to reply to every item of mail we receive. If you feel that your question or letter really needs an answer, then inclusion of an s.a.e. will guarantee a reply, although this may still take time to arrive.

Puzzle Corner

An adventurer is returning home with his treasure, which is slightly unusual in that it consists of three monsters which he is hoping to sell to Ye Olde Wizard.

He comes to a river crossing with a small boat tied up and herein lies the problem. The boat is only big enough to carry him and one of the monsters at a time.

This gives the adventurer a headache because the griffin will eat the troll is he leaves them along together and the troll will eat the hobbit.

How does our intrepid hero get to the other side of the river with his creatures still intact?

Designer Update

We have decided not to continue the Designer listing as it is significantly longer than we had originally thought. Don't worry though, the complete listing is available from us, free of charge. Simply send an A4 size SAE to our Golden Square address on the Contents page. As usual, the complete program is available on disk – see the Software for Sale pages. ED.

42
Gateshead '86

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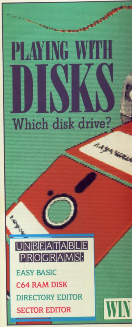

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